Progress Report

AIR QUALITY 2007

CARADON

DISTRICT COUNCIL

Working for South East Cornwall
www.caradon.gov.uk

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Executive summary

Air quality progress reports are designed to ensure continuity in the Local Air Quality Management process, providing interim annual air quality information. The aim of this report is to provide a summary of all available monitoring data for the year 2007 for comparison with the relevant air quality standards.

The report will also look at any new local developments that may affect local air quality and will discuss measures contained with the Local Transport Plan and Cornwall Air Quality Strategy that relate specifically to air quality improvements.

1.0 Introduction

1.1 Legislative background

Part IV of the Environment Act 1995 requires the UK government and devolved administrations to produce a national Air Quality Strategy, containing standards and objectives for improving ambient air quality to protect public health and the environment. Air quality in the UK has generally continued to improve since 1997 when the first Air Quality Strategy was adopted [DEFRA 2007].

The current national Air Quality Strategy was published in July 2007. It sets out the air quality standards and objectives to be achieved and introduces a new policy framework for tackling fine particles. The strategy also sets out options to further improve air quality in the UK in the long term. For the purposes of the strategy the following definitions apply [DEFRA 2007]:

- **standards** are the concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on assessment of the effects of each pollutant on human health including the effects on sensitive subgroups or on ecosystems
- **objectives** are policy targets often expressed as a maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedences, within a specified timescale.
- **EU Limit values** are legally binding EU parameters that must not be exceeded. Limit values are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedences allowed per year, if any, and a date by which it must be achieved.
- **EU Target values** are to be achieved where practicable and where the costs of doing so does not outweigh the benefits).

The air quality objectives in the Air Quality Strategy are policy targets and there is no legal requirement to meet these objectives except where they mirror any equivalent legally binding limit values in EU legislation. The air quality objectives set out in the Air Quality (England) (Amendment) Regulations 2002, as amended by the Air Quality (England) (Amendment) Regulations 2002, provide the statutory basis for the system of local air quality management as shown in Table A1, Appendix A.

Local authorities have a statutory duty for local air quality management (LAQM) under the Environment Act 1995. They are required to carry out regular reviews and assessments of air quality in their area against the standards and objectives in the national Air Quality Strategy and which have been prescribed in regulations for the purpose of LAQM. Where it is determined these are unlikely to be met, authorities must designate air quality management areas (AQMAs) and prepare and implement remedial action plans to tackle the problem.

1.2 Air quality progress reports

Air quality progress reports are designed to ensure continuity in the LAQM process, providing interim annual air quality information during the period between the more detailed three-yearly Updating and Screening Assessment. Caradon District Council last undertook an Updating and Screening Assessments in 2005 [CDC 2006].

The aim of this report is to provide a summary of all available monitoring data for the year 2007 for comparison with the relevant air quality objectives. The report will also look at any new local developments that may affect local air quality and will discuss measures contained with the Local Transport Plan and Cornwall Air Quality Strategy that relate to air quality improvements.

1.3 The Nature of the Caradon Area

Caradon District Council (CDC) covers an area in Southeast Cornwall of just under 66304 hectares (256 square miles). It is bounded by the river Fowey to the west of the district, the river Tamar to the east of the district, the A30 to the north and the English Channel to the south. It is predominantly a rural area with five main towns, where populations are in excess of 5,000 people; Liskeard, Saltash, Callington, Torpoint and Looe.

A main rail line runs through the district, in addition to the A38 which is one of the two principal road links between Devon and Cornwall (Figure 1.1). The A38 between Saltash and Landrake is the only road with an Annual Average Daily Traffic (TRF AADT) flow over 25,000 vehicles, and the main roads running through Saltash, Torpoint, Liskeard and Dobwalls have AADT flows of more than 10,000. Other main routes include the A390, and the A387/374.

Figure 1.1: map of Caradon District, illustrating the main five towns, the main routes and railway links

There are a number of industrial installations within the district that are permitted under the Pollution Prevention and Control (England and Wales) Regulations 2000 by Caradon District Council as Part B processes, including quarry and cementatious processes, roadstone coating activities and incineration, and by the Environment Agency as Part A processes, including landfill sites and clinical incineration plant.

1.4 Conclusions of previous Review and Assessment

Caradon District Council's Progress Report of air quality during 2006 [CDC 2007] concluded that the annual mean objective for nitrogen dioxide had been marginally exceeded at Tideford, and the concentration at Barrass Street, Liskeard was approaching the objective. However, the Liskeard and Tideford sites were not considered representative of relevant exposure for the annual mean objective (see Table A2) and it was recommended that these tubes be relocated.

The tube at Tideford was subsequently relocated to the building façade of a cottage set back approximately 5m from the road, and the tube at Barrass Street was relocated to the building façade of the public library; both sites now representative of relevant exposure for the annual mean objective for nitrogen dioxide.

The report also recommended the use of tube shelters for tubes located close to busy roads, where diesel lorries are queuing. Such tubes may be affected by particulates, which can give rise to a higher measured nitrogen dioxide concentration compared with the actual concentration. A tube shelter was subsequently located at Tideford.

It was also recommended that continuous monitoring equipment be installed at, or as close to, the sites at Tideford and Gunnislake during 2007, and to increase the number of tubes at Tideford and Gunnislake from July 2007. Monitoring equipment was subsequently located at Landrake, close to Tideford (Figure 2.1), but we have been unable to find a suitable location at Gunnislake. However the number of tubes have been increased at Tideford and Gunnislake.

1.5 Consultation and work with other organisations

Caradon District Council has worked in close partnership with other local Authorities throughout Cornwall, via the Cornwall Chief Officers' Pollution Sub-Group, during the preparation of this report. Public awareness of the process has been raised by placing this document on the Caradon District Council Web Site (www.caradon.gov.uk).

2.0 New monitoring results

2.1 Pollutant monitoring

Caradon District Council undertakes a combination of passive indicative monitoring of nitrogen dioxide throughout the district and continuous monitoring of ozone, nitrogen dioxide, carbon monoxide, sulphur dioxide and PM_{10} particulates at selected locations.

2.2 Public exposure

The Regulations require that the quality of air is assessed against likely exceedances of the objectives at locations where members of the public are regularly present. For the purposes of Local Air Quality Management, exceedances should not be considered at any location where public exposure is not relevant. Guidance in respect of where the objectives should and should not apply is summarised in Table A2 of Appendix A.

2.3 Passive monitoring

Diffusion tubes have been used to monitor indicative nitrogen dioxide concentrations at roadside and urban background locations throughout the district since 1994, and tubes have been supplied by Gradko Environmental since May 2005. Gradko laboratories are assessed annually by the United Kingdom Accreditation Service (UKAS) to establish conformance of the Laboratory Quality Procedures to the requirements of ISO/IEC 17025 standard. The tubes are prepared with a 50% TEA in acetone absorbent.

Whilst the results of nitrogen dioxide diffusion tubes are not as accurate and as precise as the reference method of measurement (automatic chemiluminescent analyser), diffusion tubes are a simple and cost-effective method of providing an indication of pollutant concentrations when monitored over a long period, and are particularly useful for measuring against the annual mean objective.

There are many factors that affect the performance of nitrogen dioxide diffusion tubes, such as turbulence or chemical reactions with other vehicle emissions, which may result in either a positive or negative bias relative to the reference method of measurement. In addition, different laboratories, despite using similar equipment and methods of analysis, may also exhibit different bias. A bias adjustment factor will therefore need to be calculated to account for these differences.

2.3.1 Site locations

Monitoring sites are categorised according to the type of environment in which they are located (Table A3 Appendix A). In addition background sites must be located:

- More than 50m from any major source of NO_2;
- More than 50m from any very busy road (more than 30,000 vehicles per day);
- More than 20m from any busy road (10,000 – 30,000 vehicles per day) or from any medium sized sources such as petrol stations;
- More than 10m from any road; and
- More than 5m from anywhere where vehicles may stop with their engines idling

The following map illustrate the location of the monitoring sites: background sites are represented by a blue point; roadside sites by a black point and automatic monitoring sites by a green point. All background sites meet the above criteria, and all roadside sites are located on building facades, between 1 and 5 metres from the kerb.

Figure 2.1: map of monitoring locations: blue point - background sites; black point – roadside sites; green point – continuous monitoring sites

2.3.2 Bias adjustment factor

Local Authorities using diffusion tubes as part of their Review and Assessment are advised to report both the adjustment factor from their local study, and the "national" bias adjustment factor [UWE 2008], which is determined from collocation studies throughout the UK.

The 2007 national bias adjustment factor for Gradko tubes (prepared with a 50% TEA in acetone absorbent) has been compiled from 15 studies with values ranging from 0.79 to 1.17, and the overall factor has been determined as 0.98 [UWE 2008(2)]

A local co-location study using triplicate exposure was undertaken at the continuous air monitoring site at New Road, Saltash during 2007. The data is shown below in Table 1.

Table 2.1: Co-location study

			Tube data				Continuous data	
Period	From	To	Tube 1 µg.m^{-3}	Tube 2 µg.m^{-3}	Tube 3 µg.m^{-3}	Tube mean (Dm) µg.m-3	Period Mean (Cm) µg.m-3	Data Capture (% DC)
1	03/01/07	01/02/07	12.7	14.4	13.7	13.6	14.3	97.5
2	01/02/07	01/03/07	18.9	17.6	17.2	17.9	20.4	97.8
3	01/03/07	04/04/07	16.8	18.9	17.9	17.9	17.9	97.5
4	04/04/07	03/05/07	18.2	28.8	17.9	21.7	24.3	96.0
5	03/05/07	01/06/07	11.5	12.3	12.1	12.0	13.7	97.2
6	01/06/07	06/07/07	14.9	15.6	14.6	15.0	13.3	97.9
7	06/07/07	02/08/07	13.4	12.5	12.7	12.8	10.7	97.9
8	02/08/07	29/08/07	13.7	12.5	13.2	13.1	11.0	92.6
9	29/08/07	04/10/07	15.8	15.5	7.2	12.8	15.0	97.2
10	04/10/07	01/11/07	24.0	22.8	24.3	23.7	24.6	97.3
11	01/11/07	30/11/07	37.2	24.6	25.4	29.1	26.3	97.9
12	30/11/07	03/01/08	21.9	22.2	25.4	23.2	22.0	97.8
Annual mean						**17.7**	**17.8**	

There are five data points that, when compared with the corresponding tube data and the continuous data, are potential outliers (highlighted in blue). However, guidance states that "*Where the bias adjustment factor is then used to correct data at sites where only a single tube has been exposed, outliers **should not** be removed from the triplicate tube data, as this variance is also present in the single tube data*". [UWE 2008]. The bias adjustment factor is calculated by dividing Cm by Dm [DEFRA 2003] to give a value of 17.8/17.7 = 1.00

The co-location data was entered into the AEA Energy and Environment spreadsheet, which is replicated in Appendix C. The spreadsheet shows that the continuous monitoring data capture is above 90% for each period and is therefore classified as "good", whilst the overall precision of the tube data is classified as "poor" due to periods 4, 9 and 11 having a CV of over 20. Further explanation of the information in Figure C1 can be found by downloading the spreadsheet from the UK Air Quality Archive [UKAQA 2008].

Summary

The national bias adjustment factor: 0.98
The local bias adjustment factor: 1:00

The decision on which bias adjustment to use depends upon a number of factors that will need to be considered [UWE 2008]:

Table 2.2: When to use the local and national bias adjustment factors

When to use the local factor		When to use the national factor	
When to exposure periods are other than monthly	×	When the exposure periods are monthly	✓
If the co-location site is unusual	×	Where the source of NO_2 at the co-location site is traffic	✓
For tubes exposed in a similar setting to the co-location site	✓	Where tubes are exposed over a range of settings that differ from the co-location site	×
Where the duration of the whole diffusion tube study is less than one year and less than 9 months	✓	Where the co-location study is for less than 9 months and the tubes are for a longer period	×
Where national value contains less than five studies	×	Where the national value contains more than five studies	✓
Where the co-location study is spread across more than one calendar year	×	Where the automatic analyser has been operated using local, QA/QC procedures	✓
For co-location sites with good precision for the diffusion tubes	×	For co-location sites with poor precision	✓
For co-location sites with high quality chemiluminescence results	✓	Where data capture is less than 90%	×

The table indicates that the national bias adjustment factor is likely to be more representative. However, a bias adjustment is only really relevant when an unadjusted value is close to the objective, and when the application of a bias adjustment factor is likely to tip the scale. The diffusion tube data for 2007 are summarised in Table C1, Appendix C and both bias adjustment factors have been reported. The local bias adjustment factor of 1.00 agrees with the conclusions of the Updating and Screening Assessment 2005, which concluded that the raw data, ie a factor of 1.00, was likely to be more accurate than data adjusted by the national bias adjustment factor [CDC 2006].

2.3.3 Diffusion tube data for 2007 (roadside locations)

At the end of 2006 monitoring was discontinued at sites with low annual means and again at the end of June 2007, to allow tubes to be relocated at sites where further monitoring was required, such as Gunnislake and Tideford, and to allow triplicate co-location at 2 continuous monitoring sites. Diffusion tube monitoring was discontinued at Dobwalls following installation of a continuous monitor.

Tubes at other sites, such as Barrass Street, Liskeard, Tideford and Carkeel were re-located in the same area to represent relevant exposure ie building façade, rather than lamp-post mounted at the kerbside. The annual diffusion tube data for 2007 is shown in Appendix C.

The change in monitoring locations in July 2007 resulted in short-term data sets. LAQM TG(03) states that for the annual mean nitrogen dioxide objective, a three-month survey may be sufficient, and if a short-term data set is well below (or well above) the objective then this would be considered sufficient data. The only short-term data set that is close to the objective is at Gunnislake Swiss Cottage and this is discussed in section 2.3.5 below.

Figure C1 and Table C1 in Appendix C illustrate that three sites have values over 30 µg.m^{-3}: Carkeel, Gunnislake and Tideford. Carkeel and Gunnislake are approaching the objective and Tideford has significantly exceeded the objective. The data is summarised in Figure 2.2.

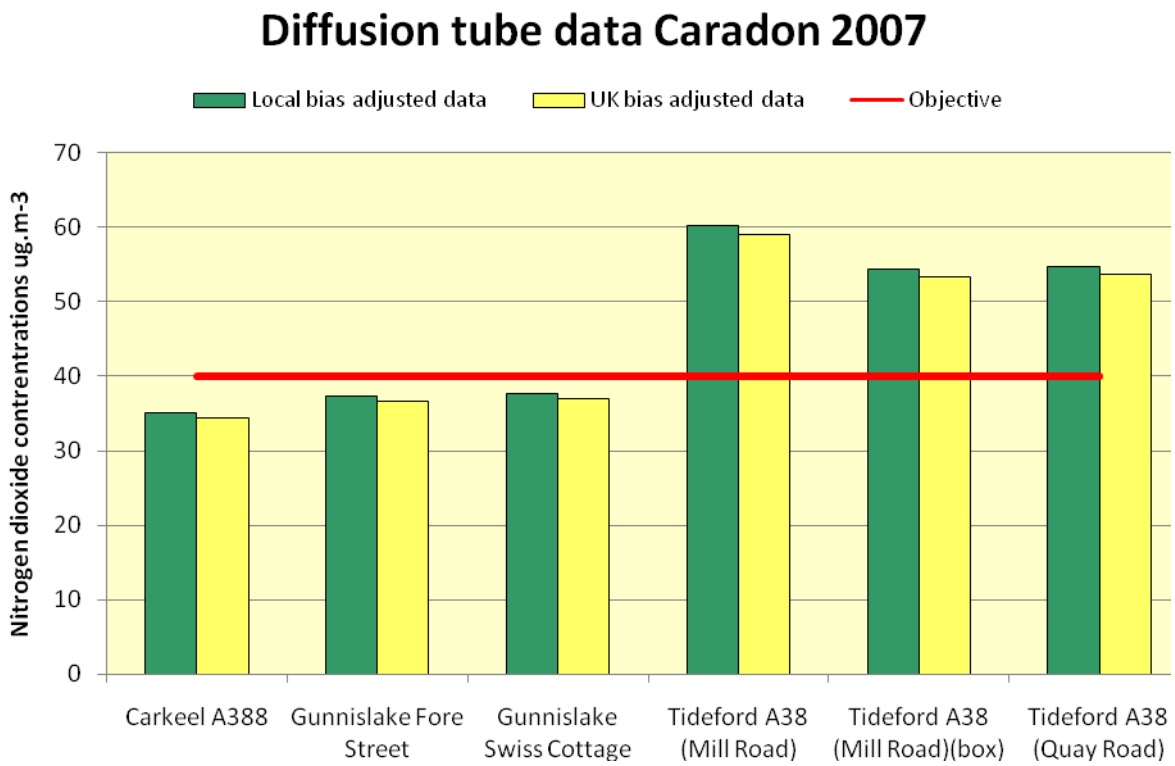


Figure 2.2: graph illustrating sites with annual averages over 30 µg.m^{-3}

2.3.4 Tideford

Tideford is busy section of the A38, where the duel carriageway reduces to single lane as it passes through the small village of Tideford where a 40 mph speed restriction is in force. The A38 at Mill Road, Tideford has a TRF AADT of 28400 and a HCV MGV component of 2300; the A38 at Quay Road has a TRF AADT of 31000 with a HCV MGV value of 2300. During peak periods traffic queues along this stretch of road on the west-bound carriageway due to tailbacks at Trerulefoot roundabout. There are no industrial sites nearby and the main nitrogen dioxide source is traffic.

During 2006 the site at Tideford was approaching the objective. However, the site was not representative of relevant exposure, and in January 2007 the diffusion tube monitoring site was moved to a location approximately 100m east on the west-bound carriageway and mounted at the building façade of a row of cottages set back approximately 5m from the road. There are no areas in Tideford that qualify for relevant exposure to the hourly objective.

When by June 2007 it became apparent that the monthly concentrations were consistently exceeding the annual objective, further tubes were located at the building façade on Quay Road 1 m from the A38, and in Bridge Road, at distances of 5 m and 10 m from the A38 as illustrated in Figure 2.3.

Figure 2.3: Location of tubes at Tideford: 2007 tube locations are indicated by a red point and the discontinued 2006 tube site by a yellow point

It is understood that tubes located close to busy roads where diesel lorries queue, may be affected by particulates, which can give rise to a higher measured nitrogen dioxide concentration compared with the actual concentration [Gradko 2006]. An additional tube was therefore co-located at the Mill Road site and contained in a tube shelter. The reduction, however, is irrelevant since the objective has been exceeded by a significant amount.

The tubes on Bridge Road show a significant decrease when compared with the A38 sites, with both results well under the objective (Figure 2.4). It was not possible to install a continuous monitor at Tideford due to an insufficient power supply to the village. A continuous monitor was, however, installed at Landrake on the A38 at the end of 2007 which is relatively representative of the Tideford site; 40mph single-lane carriage way with a similar AADT. There are, however, no properties at Landrake that are close to the highway.

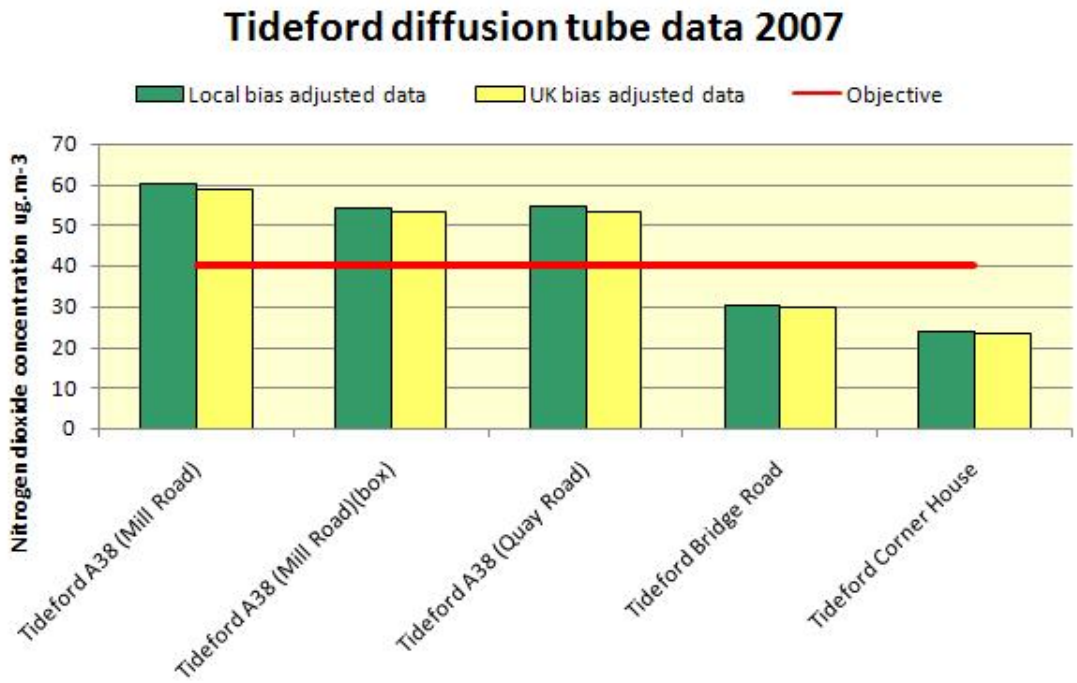


Figure 2.4: Tideford diffusion tube monitoring data 2007

Nitrogen dioxide concentrations for 2010, the date by which the objective must be legally achieved and maintained, are predicted to exceed the objective at Tideford. Predictive data for all sites in Caradon are shown in Table C2 in Appendix C and summarised for Tideford in Table 2.3 below. Yellow highlighted data illustrates exceedences

Table 2.3: predicted nitrogen dioxide concentrations µg.m-3

2007 data Site name and description		Local bias factor	UK bias factor	Predicted values based on 2007 local bias adjusted data		
		2007	2007	2008	2009	2010
R	Tideford A38 (Mill Road)	60.25	59.05	57.54	54.83	52.34
R	Tideford A38 (Mill Road)(box)	54.43	53.34	51.98	49.53	47.28
R	Tideford A38 (Quay Road)	54.69	53.59	52.23	49.76	47.51
R	Tideford Bridge Road	30.61	29.99	29.23	27.85	26.59
R	Tideford Corner House	23.91	23.44	22.84	21.76	20.77

2.3.5 Gunnislake

Gunnislake is located on the A390 on the Cornwall/Devon border and is the main route into Cornwall from West Devon. The A390 has a TRF AADT of 8100 with a HCV AADT component of 280. After crossing border the road travels approximately 100m up a hill to traffic lights, where there are regular queues outside residential properties. Traffic through the main village street, Fore Street, is controlled by 3-way traffic lights that only allow one stream of traffic through at a time. Traffic is the main source of nitrogen dioxide emissions in Gunnislake.

A comparison of the 2006 and 2007 annual mean nitrogen dioxide concentrations in Fore Street is shown below. There are no sites in Gunnislake that qualify for relevant exposure to the hourly objective.

Site	2006 annual mean		2007 annual mean	
	Raw data $\mu g.m^{-3}$	UK bias adjusted data $\mu g.m^{-3}$	Raw data $\mu g.m^{-3}$	UK bias adjusted data $\mu g.m^{-3}$
Gunnislake Fore Street	35.21	36.62	37.37	36.62

In July 2007 the number of tubes at Gunnislake was increased, with an additional tube placed on the façade of Swiss Cottage located just down from the traffic lights on Newbridge Hill leading up from the bridge. There is no pavement at this point and the cottage is at the roadside. Two further tubes were placed in Under Road at distances of 3m and 5m from the A390 as illustrated in Figure 2.5.

Figure 2.5: Location of nitrogen dioxide diffusion tubes at Gunnislake 2007: the tubes are indicated by a red point.

The tubes on Under Road show a significant decrease when compared with the A390 tubes, with both results well under the objective (Figure 2.4). It has not been possible to install a continuous monitor at Gunnislake due to a lack of suitable sites. A continuous monitor at St Ann's Chapel was being considered, but the site is not representative of that at Gunnislake.

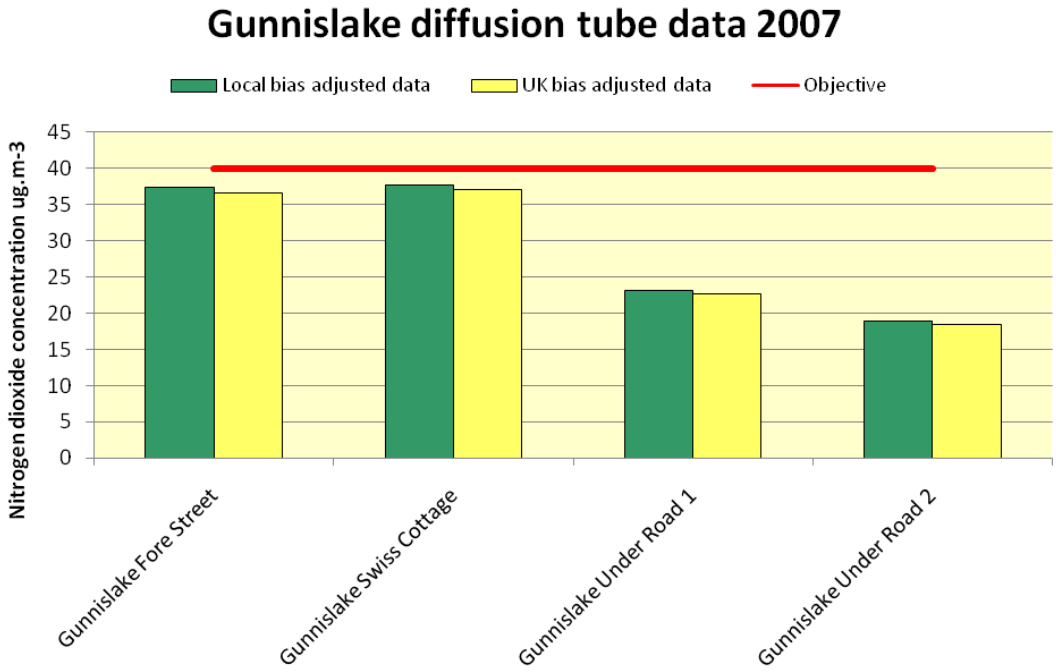


Figure 2.6: Gunnislake diffusion tube monitoring data 2007

Nitrogen dioxide concentrations for 2010, the date by which the objective must be legally achieved and maintained, are not predicted to exceed the objective at Gunnislake. Predictive data for all sites in Caradon are shown in Table C2 in Appendix C and summarised for Gunnislake in Table 2.4 below.

Table 2.4: predicted nitrogen dioxide concentrations μg.m^{-3}

2007 data Site name and description		Local bias factor	UK bias factor	Predicted values based on 2007 local bias adjusted data		
		2007	2007	2008	2009	2010
R	Gunnislake Fore Street	37.37	36.62	35.69	34.00	32.46
R	Gunnislake Swiss Cottage	37.72	36.96	36.02	34.32	32.77
R	Gunnislake Under Road 1	23.09	22.62	22.05	21.01	20.06
R	Gunnislake Under Road 2	18.84	18.46	17.99	17.14	16.37

As discussed in section 2.3.2, the only short-term data set that is close to the objective is at Gunnislake Swiss Cottage. LAQM TG(03) gives advice on estimating a more realistic annual mean by using long-term data sets. Using the guidance in LAQM TG(03), the following ratios were calculated.

11 data sets from sites with 11 and 12 months data	1.01
2 data sets from background sits with 11 months data	1.02
5 data sets from roadside sites with 12 months data	1.03

Looking at worst case scenario this would increase the Gunnislake site to 38.85 $\mu g.m^{-3}$, (raw data and local bias factor adjusted data), and 38.07 $\mu g.m^{-3}$ (UK bias factor adjusted data). However, previous studies have shown that derived scaling factors can be subject to considerable error (DEFRA 2003).

2.3.6 Carkeel

Carkeel is located on the A388 just off the A38 at Saltash and is the main route from Saltash to the eastern towns and villages in Caradon and, to Launceston in the district of North Cornwall. The A388 has a TRF AADT of 14900 and a HCV AADT of 620.

Figure 2.7: Location of nitrogen dioxide diffusion tubes at Carkeel 2007: the 2007 tube is indicated by a red point.

The road narrows as it passes through Carkeel and traffic queues through Carkeel in the direction of Saltash during peak periods due to tailbacks from the roundabout on the A38. Residential properties are mainly located on the eastbound carriageway, the majority of which are set back from the road.

There is an industrial estate to the south-east of Carkeel containing 2 A1 permitted installations: Saltash Civic Amenity site and Sealand Waste Disposal who collect, treat and transport liquid waste. There is also one part-B dry cleaners on the site and two large retail stores; Focus and Waitrose. The main source of nitrogen dioxide emissions at Carkeel is due to traffic.

In 2006 the annual nitrogen dioxide concentration was 14.26 μg.m-3. However, the location of the tube was not considered to be representative of relevant exposure and in 2007 the tube was moved just a few metres to a more relevant site. The annual nitrogen dioxide concentration for 2007 was 35.06 μg.m^{-3} (raw and local bias factor adjusted) and 34.36 μg.m-3 (national bias factor adjusted), which is approaching the annual objective.

Nitrogen dioxide concentrations for 2010, the date by which the objective must be legally achieved and maintained, are not predicted to exceed the objective at Carkeel. Predictive data for all sites in Caradon are shown in Table C2 in Appendix C and summarised for Carkeel in Table 2.5 below.

Table 2.5: predicted nitrogen dioxide concentrations μg.m-3

2007 data Site name and description		Local bias factor	UK bias factor	Predicted values based on 2007 local bias adjusted data		
		2007	2007	2008	2009	2010
R	Carkeel	35.06	34.36	33.48	31.91	30.46

2.3.7 Diffusion tube data for 2006 (suburban locations)

The nitrogen dioxide concentrations at suburban locations are both below 10 μg.m^{-3}, and are illustrated in Figure 2.8. The number of background monitoring sites was reduced during 2007.

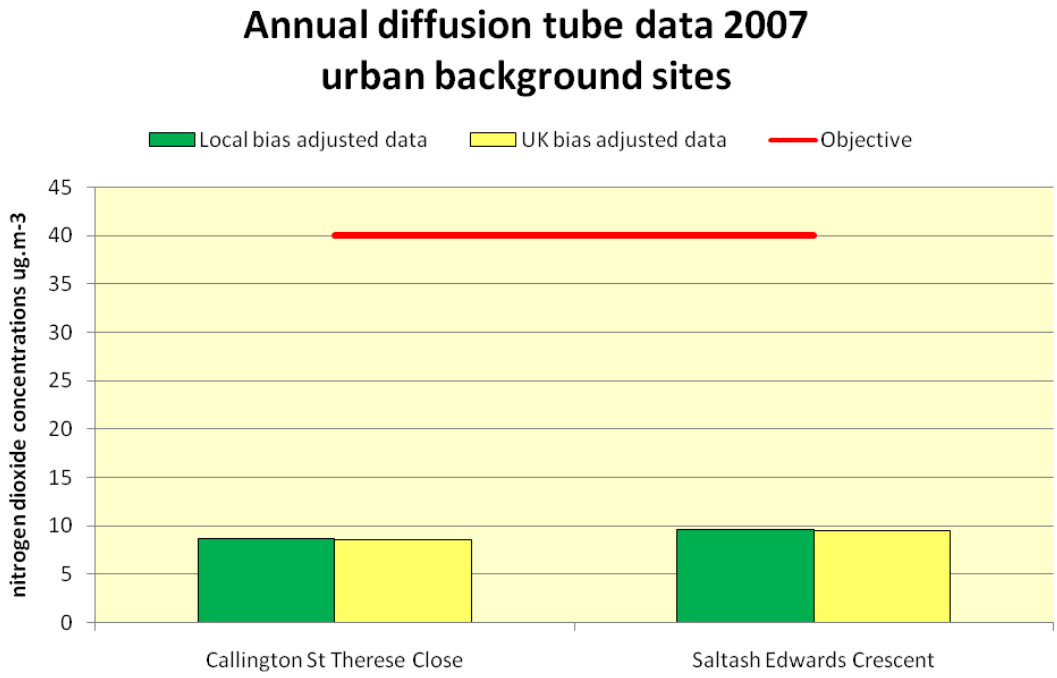


Figure 2.8: NO_2 concentrations at urban background locations in 2006

2.3.8 Trends

It is difficult to illustrate trends across the district as diffusion monitoring is reviewed each year and the sites locations changed to ensure that data across the district is captured. Even the long-term background monitoring site at Callington has been subject to changes; for example in 2004 the site was changed from behind the St Therese road sign to a lamppost in St Therese Road; in 2005 the tube was moved a few meters to Hazelwood Road due to road works in St Therese, and remained there throughout 2005; and the tube was returned to St Therese for 2006, where it has since remained.

Therefore, although Figure 2.9 illustrates a decreasing trend since 2002, it would be more representative to consider years 2004, 2006 and 2007, which shows that that the concentrations are staying roughly the same at just under 9 $\mu g.m^{-3}$

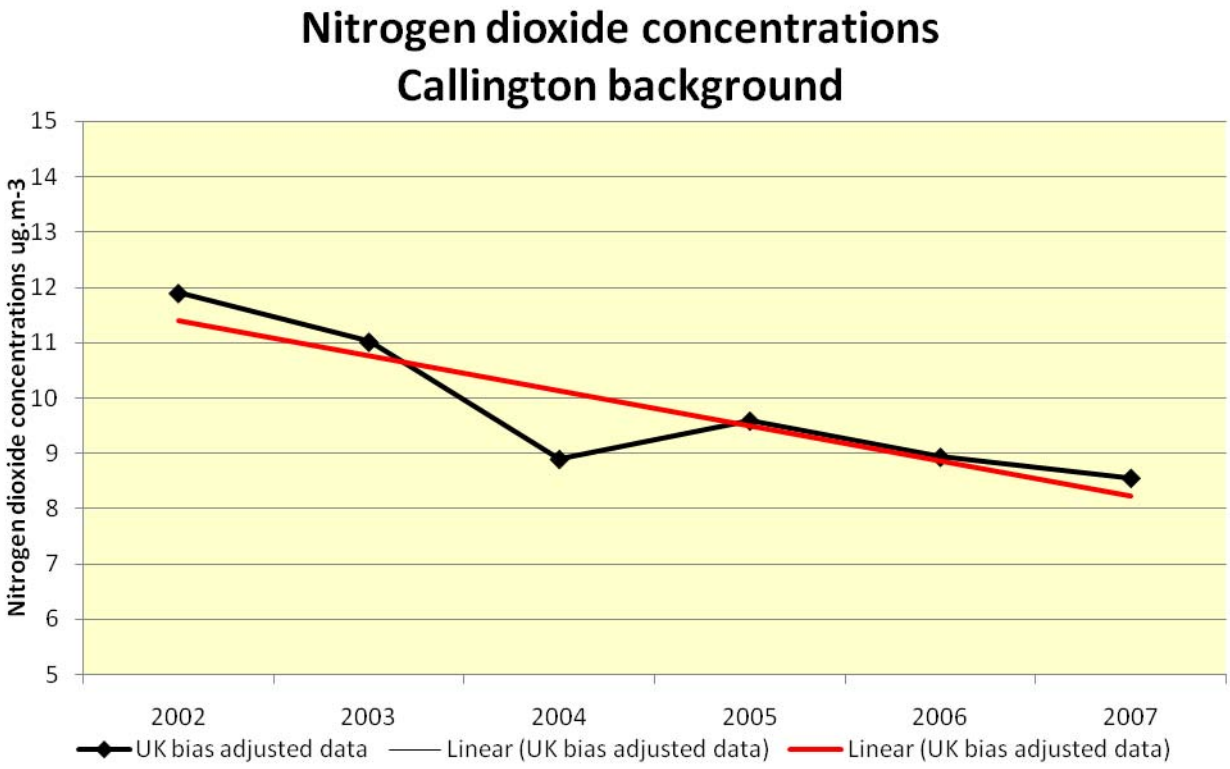


Figure 2.9: Chart illustrating trend in nitrogen dioxide concentrations at the Callington background site between 2002 and 2007

2.4 Continuous monitoring

Continuous monitoring is undertaken at Dobwalls, Callington and at three sites in Saltash. Details of the location of the monitoring sites are illustrated in Figure 2.1.

We were unable to provide the majority of continuous monitoring data for 2006 in the last progress report [CDC 2007] due to problems with the supply of data from the company who supplied the air monitoring equipment and run the sites on our behalf (all sites with the exception of Saltash, Callington Road).

In 2008 we commissioned an air quality consultant to analyse the continuous data for 2006 and 2007. Unfortunately the data supply problems continued and the data that was eventually supplied was incomplete and provided in a variety of time base formats, often in the same spreadsheet.

Additional problems with the data included a lack of calibration data for all sites, with calibrations only being undertaken during the 6-month service. The air quality consultant also reported that there was significant drift on some measurements, especially at Saltash New Road, where the nitrogen dioxide and sulphur dioxide data have are unuseable.

Data sets will only be considered 'good' where the data capture rate is greater than 90%. For all monitored pollutants data capture rates were mainly poor during 2006, but improved during 2007. However some sites still fall below the 90% threshold including New Road, Saltash for nitrogen dioxide and Callington for carbon monoxide and PM_{10}.

The data for the long-term continuous monitoring site at Saltash, Callington Road has been calibrated and validated in accordance with the technical guidance [DEFRA 2003]. The data for the remaining air quality sites is essentially screened, raw data, due to infrequent calibration, and should be considered as indicative monitoring rather than compliance monitoring.

The pollutant annual plots provided in the air quality consultant's report have been reproduced in Appendix D.

2.4.1 QA/QC procedures

All the automatic analysers are regularly serviced and housed in air-conditioned units. The NO_x and O_3 analysers at the Callington Road site at Saltash are automatically calibrated on a daily basis from certified gas cylinders, and the filters are changed on a regular basis. The TEOM filter at the Callington Road site is changed at around 80% and new filters are stored within the TEOM unit to maintain the same temperature.

2.4.2 Nitrogen dioxide

During 2006 and 2007 nitrogen dioxide concentrations were continuously measured through the use of chemiluminescent analysers at five locations. The data is summarised in tables 2.6 and 2.7.

Table 2.6: Nitrogen dioxide continuous monitoring data 2006				
Monitoring site	Annual mean	Maximum hourly mean	Exceedences hourly mean	Data Capture
	$\mu g.m^{-3}$	$\mu g.m^{-3}$	Number	%
Callington	22.0	150.9	0	74
Dobwalls	38.2	289.4	5	92
Saltash New Road	20.2	115.9	0	64
Saltash VPG	18.1	99.1	0	83
Saltash Callington Rd	14.1	78.9	0	93
Objective	**40.0**	**200**	**18**	

Table 2.7: Nitrogen dioxide continuous monitoring data 2007				
Monitoring site	Annual mean	Maximum hourly mean	Exceedences hourly mean	Data Capture
	$\mu g.m^{-3}$	$\mu g.m^{-3}$	Number	%
Callington	15.2	71.1	0	97
Dobwalls	25.7	205.4	1	95
Saltash New Road	14.3	115.0	0	69
Saltash VPG	11.3	225.1	2	100
Saltash Callington Rd	17.7	99.8	0	99
Objective	**40.0**	**200**	**18**	

The nitrogen dioxide concentrations for 2006 and 2007 fall significantly below the air quality objectives, with the exception of Dobwalls in 2006, which was close to the annual mean objective. During 2007, however, the annual mean concentration fell to 26 $\mu g.m^{-3}$. This was likely to be due to road alterations as part of the A38 Dobwalls bypass works, which helped to prevent queues forming through the village.

Figure 2.10 below also illustrates that nitrogen dioxide values have also decreased at the Callington and Saltash VPG sites, but slightly increased at the Saltash, Callington Road site. It is not clear whether actual concentrations fell in 2007 or whether the reduced concentrations are due to improved data capture in 2007.

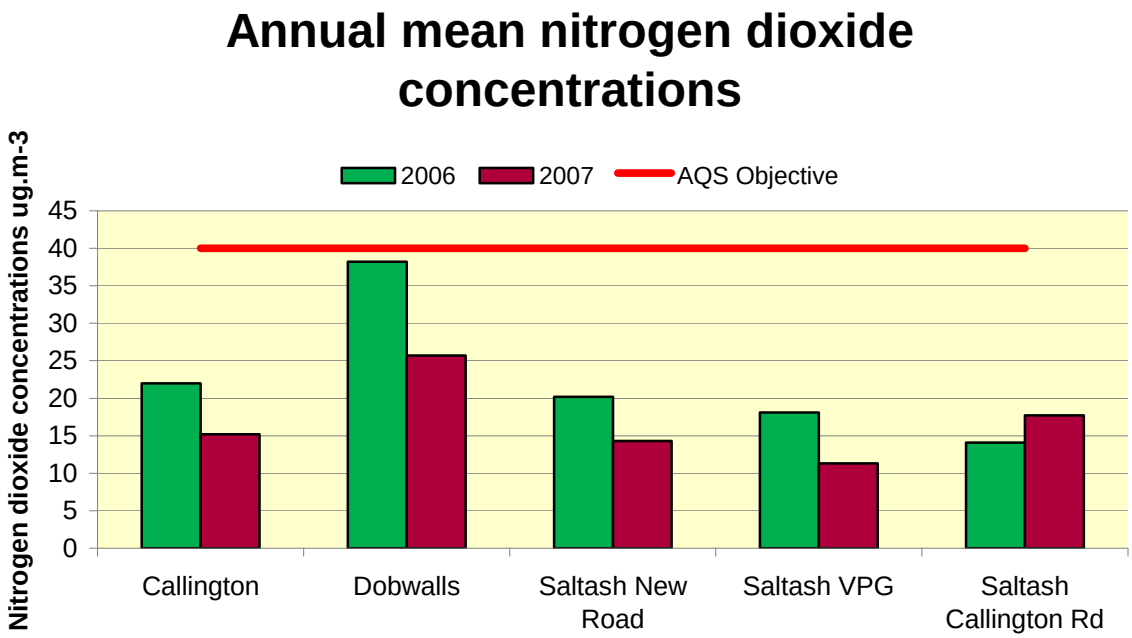


Figure 2.10: annual mean continuously monitored NO2 concentrations

2.4.3 Carbon monoxide

Carbon monoxide was continuously monitored at two locations in the district throughout 2006 and 2007. The monitoring data is summarised in Table 2.8 and shows that the values are significantly below the AQS objective.

Table 2.8: Carbon monoxide continuous monitoring data 2006 and 2007

Monitoring site	Maximum daily 8-hour mean 2006	Data Capture 2006	Maximum running 8-hour mean 2007	Data Capture 2007
	$mg.m^{-3}$	%	$mg.m^{-3}$	%
Callington	2.0	50	2.2	88
Dobwalls	2.0	82	1.0	92
Objective	**10.0**		**10.0**	

2.4.4 PM_{10} particulates

During 2006 and 2007 PM_{10} particulates were continuously monitored through the use of a Tapered Element Oscillating Microbalance (TEOM) at two locations in Saltash, and at one location in Callington.

The TEOM derived data has been multiplied by a factor of 1.3 in accordance with the guidance [DEFRA 2003] to give concentrations expressed as $\mu g.m^{-3}$ gravimetric for comparison with the AQS Objectives.

The monitoring data is summarized below in Tables 2.9 and shows that the concentration of PM_{10} particulates at all sites fall below the annual mean objective and well within the number of permitted exceedences of the 24-hour mean.

Table 2.9: PM_{10} particulate continuous monitoring data 2006

Monitoring site	Annual mean	Maximum 24-hour mean	Exceedences	Data Capture
2006	$\mu g.m^{-3}$	$\mu g.m^{-3}$	Number	%
Callington	26.26	50.44	1	72
Saltash Callington Rd	22.36	52.52	1	70
Saltash VPG	19.89	41.73	0	64
2007				
Callington	24.57	105.17	1	86
Saltash Callington Rd	21.32	104.91	3	99
Saltash VPG	21.06	96.59	1	96
Objective	**40.0**	**50**	**35**	

2.4.6 Ozone

Ozone is continually monitored at the Callington Road, Saltash site. The maximum 8-hour mean has been exceeded on a significantly greater number of occasions than the AQS Objective, although the number of exceedences reduced in 2007. Ozone, however, is not regulated for the purposes of LAQM.

Table 2.10: Ozone continuous monitoring 2006-7

Monitoring site	Year	Maximum 8-hour mean	Exceedences	Data Capture
		$\mu g.m^{-3}$	Number	%
Saltash Callington Rd	2006	243.8	86	98
Saltash Callington Rd	2007	152.6	54	98
AQS Objective		**100**	**10**	

2.5 Other air quality data

The Environmental Protection Department also deals with range of nuisance complaints including odour, mainly from agricultural spreading; garden bonfires; and unauthorised burning of commercial waste.

All farmers are encouraged to plough organic manure in to the soil within 24 hours of spreading in accordance with DEFRA's guidance. This helps to minimise the duration of odours and ammonia loss to atmosphere. In 2007 there were 11 complaints in respect of agricultural spreading and no abatement notices were served.

In response to complaints regarding garden bonfires, residents who burn regularly are encouraged to compost garden waste or to take advantage of the Council's green waste collection service. There was 1 abatement notice served during 2007.

Complaints regarding unauthorised burning of commercial waste are usually restricted to building sites and farms. Offenders are given written warnings in respect of contraventions under the Environmental Protection Act 1990 and the Clean Air Act 1993 and given advice in respect of waste management. There were 33 complaints in respect of unauthorised burning of commercial waste in 2007.

During 2007 there were no air quality complaints in respect of the Part-B permitted industrial installations.

3.0 New local developments

3.1 Introduction

This section details changes that have taken place that may affect air quality so that they can be considered more thoroughly during the next full round of review and assessment.

3.2 Part A processes

All existing and new dry cleaning premises were required to be permitted as Part-B installations under the Pollution Prevention and Control Act 1999 by October 2007. There are two existing dry cleaning installations in Caradon; one in Saltash and one in Liskeard

3.3 Part B processes

All existing and new dry cleaning premises were required to be permitted as Part-B installations under the Pollution Prevention and Control Act 1999 by October 2007. There are two existing dry cleaning installations in Caradon; one in Saltash and one in Liskeard

3.4 New retail development

There was no new retail development in 2007.

3.5 New road schemes

The Dobwalls A38 bypass scheme commenced during 2006 and the stretch bypassing Dobwalls opened in October 2008. The scheme will be completed by the end of 2008 and is anticipated to reduced traffic though Dobwalls by 90% [HA 2008].

3.6 New mineral development

There was no new mineral development in 2007

3.7 New landfill development

There was no new landfill development in 2007

3.8 New mixed use development (residential/commercial)

There was no new development in 2007 that would impact on air quality or significantly change traffic flows.

4.0 Local Air Quality Strategy

4.1 Introduction

The Cornwall Air Quality Strategy was published in December 2004 by the Cornwall Air Quality Forum (CAQF), with the aim of achieving excellent air quality across Cornwall to protect public health and the environment [CAFQ 2004]. CAFQ has representatives from five district councils, Cornwall County Council, the Environment Agency, the Health Community and Cornwall College.

Through the processes of public workshops and air quality monitoring and review, eight main scenarios for action were identified (Figure 15), and measures to address these areas were compiled into a comprehensive Implementation Plan.

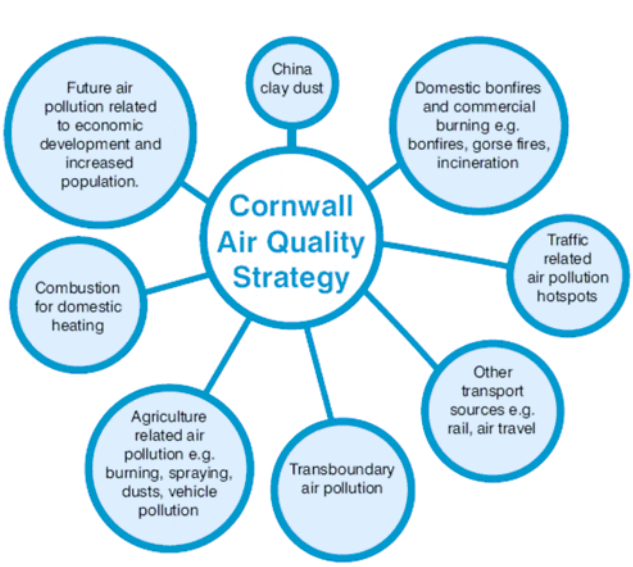


Figure 4.1: main pollution scenarios in Cornwall

4.2 Actions relevant to Caradon District are as follows:

Action 1b *To carry out continuous monitoring on the A38 at Dobwalls by 2003/4*

Continuous monitoring of nitrogen dioxide and carbon monoxide commenced at Dobwalls in October 2003 and will be discontinued in December 2008 due to the opening of the A38 bypass

Action 1c - *To address the air quality on the A38 Dobwalls by 2007*

Dobwalls is a small village located on the A38, one of two main trunk roads in Cornwall. The A38 reduces to single carriageway as it passes through the village giving rise to congestion and subsequent noise and air pollution. In late 2008 the Highways Agency will complete work on the Dobwalls bypass, which will reduce traffic through the village by around 90%.

Action 1d – *Further investigate air quality in Saltash by installing continuous monitoring and a network of diffusion tubes by 2005/2006.*

In December 2004 the air monitoring unit was transferred from Dobwalls to Saltash and installed at the junction of Callington Road and New Road, identified in the Updating and Screening Assessment 2003 [CDC 2004] as a busy junction. The unit continuously monitors nitrogen dioxide, ozone and PM_{10} particulates.

In October 2005 two further units were installed in areas of Saltash, previously identified as pollution hotspots, to continuously monitor nitrogen dioxide, sulphur dioxide and PM_{10} particulates.

Action 1e – *Further investigate air quality in Liskeard by installing continuous monitoring and a network of diffusion tubes by 2005/2006*.

The Cornwall Air Quality Forum installed a network of diffusion tubes between June and September 2004. The subsequent report [CAQF 2004] concluded that the programme nitrogen dioxide concentrations did not exceed the annual objective of 40 $\mu g\ m^{-3}$, but predicted that the annual nitrogen dioxide concentrations may exceed the objective in some locations. However the diffusion tubes were located at roadside locations on lampposts and not at the building façade.

The survey identified that the highest concentrations of nitrogen dioxide occurred along the B3254 though the town. This road has the highest traffic flow and is subject to congestion. Subsequent diffusion tube monitoring, however, at a relevant location in Barrass Street gave an annual mean of below 30 $\mu g.m^{-3}$ for 2007. Nevertheless it is anticipated that further monitoring will be undertaken in Barn Street for 2009.

Action 1f – *Further investigate air quality in Torpoint by installing continuous monitoring by 2007/2008*.

Nitrogen dioxide passive tube monitoring has not identified a requirement for continuous monitoring in Torpoint. This action point is therefore no longer applicable.

Action 1g – *Further investigate air quality in Looe by installing continuous monitoring by 2007/2008*.

Nitrogen dioxide passive tube monitoring has not identified a requirement for continuous monitoring in Looe. This action point is therefore no longer applicable.

Action 1f – *Further investigate air quality in Callington by installing continuous monitoring by 2007/2008*.

Air quality monitoring equipment was installed in Callington in Oct 05, to continuously monitor nitrogen dioxide, carbon monoxide and PM_{10} particulates

Further updates on the Cornwall Air Quality Strategy Implementation Plan will be published on the CAQF website in due course.

5.0 Planning and policies

5.1 National air quality planning policies

At a national level, Planning Policy Statements set out the Government's core policies and principles on the most import aspect of land use planning. Planning Policy Statement 23: Planning and Pollution Control offers guidance in respect of planning and air quality [ODPM 2004]. Matters for consideration in preparing local development documents and taking decisions on individual planning applications include:

- The existing and likely future air quality in an area, including any Air Quality Management Areas or other areas where air quality is likely to be poor.
- The need for compliance with the air quality objectives
- The need to limit and where possible reduce greenhouse gas emissions and take account of potential effects of climate change
- The possibility that emissions of smoke, fumes, gases, dust, steam, odour, noise and vibration may be seriously detrimental to amenity in addition to constituting a statutory nuisance under Part III of the Environmental Protection Act 1990

5.2 County air quality planning policies

At a county level, Cornwall Structure Plan 2004 [CCC 2004] includes policies for transport and accessibility, which seek to reduce the need for travel and encourage alternative modes to the private car, which is seen as the major way in which planning policies can contribute to improved air quality.

5.3 Local air quality planning policies

At a district level, the land use policies and proposals throughout the Caradon Local Plan 1999 have been framed with a view to limiting air pollution from new development or reducing existing air pollution wherever possible. Policy Haz4 states that:

Proposals for new development or redevelopment will not be permitted on sites adjacent to existing installations that are authorised or licensed under pollution control legislation, unless:

I. The proposed uses are able to co-exist with such polluting activities, and

II. Adequate mitigation measures to counter adverse effects arising from pollution of or by air can be undertaken

Any application for proposed development or change of use which may impact on air quality is forwarded to Environmental Health for assessment of the impacts and subsequent comment. Any proposed development will require an air quality assessment where a significant change in air quality or in exposure is expected or anticipated.

The Cornwall Air Quality Forum produced a document in 2007, bringing together national guidance, assisting developers and planners to determine whether or not an air quality assessment is required. A useful flow-chart from the document is reproduced in Appendix E [CAQF 2007].

The following cases are typical of where the need for an air quality assessment should be considered [NSCA 2004]:

- Proposals that will result in increased congestion, a change in either traffic volumes (for example 5% AADT or peak) or a change in vehicle speed (± 10 kph), or both, on a road with greater than 10,000 vpd;
- Proposals that would significantly alter the traffic composition in an area (eg bus stations, HGV parks, increased delivery traffic);
- Proposals that include new car parking (> 300 spaces) or coach or lorry park;
- Developments located in, or which may affect, sensitive areas (eg ecological sites) or areas of poor air quality (including AQMAs), where either direct emissions to air occur, or where any of the preceding criteria are met;
- For industrial type development where installations are permitted under Pollution Prevention and Control or waste management licensing.

5.4 Planning applications

No planning applications were received in 2007 for developments for which an air quality assessment was required. Planning applications in 2008 for which an air quality assessment was requested are as follows:

Sainsbury in Saltash
Tesco in Callington
Small residential development on land adjacent to A38 Dobwalls bypass
Large residential development in Liskeard (Addington)

6.0 Local transport plans and strategies

6.1 Local transport problems

Solving local transport problems is a major challenge, with a need to support social and economic desires, whilst balancing these with environmental concerns and available financial resources. There are also development pressures to be met, with new housing requirements and associated road infrastructure. In addition, in Cornwall there are further pressures associated with the large seasonal influx of visitors each year.

6.2 The Cornwall Local Transport Plan

The Government has identified shared priority areas in respect of transport and Local Authorities are required to demonstrate that the issues of 'reduced problems of air pollution' are being progressed. This is achieved through the Transport Aims of the Local Transport Plan.

The Cornwall Local Transport Plan 2006 – 2011 was published by Cornwall County Council in March 2006 [CCC 2006]. The plan recognises that road transport is a key source of air pollution, accounting for over half of the total emissions of nitrogen oxides and particles, in addition to carbon dioxide emissions linked to climate change. The plan also identifies an emergence of localised air pollution hotspots in some towns, particularly those subjected to traffic congestion.

Transport Aim 3 aims to reduce the growth of traffic congestion and transport related air pollution in Cornwall by:

- Managing, maintaining and improving the efficiency and effectiveness of the transport network;
- Providing opportunities for travel choice; and
- Influencing travel behaviour by raising awareness of the impact of transport on the environment and the health benefits of walking and cycling.

The air quality toolkit will assist in addressing air quality issues in Cornwall

Figure 6.1: Air Quality Toolkit [CCC 2006]

6.3 Schemes to address air quality

The Transport Plan has identified sites where air quality problems exist and need to be addressed. This will focus on the main urban centres of Camborne, Redruth, Falmouth, Bodmin, Truro and Penzance. None of these locations are with the district of Caradon.

However, although resources for regeneration and congestion have been prioritised to the above urban centres in Cornwall, where they will deliver the greatest outcomes, the other main towns within Cornwall each have a transport strategy with scheme proposals that deliver the more local regeneration and congestion benefits.

A modest allocation has been included within the overall five year delivery programme to deliver key schemes within these towns, to include:

- traffic management improvements in Liskeard linked to a regeneration scheme, which reduces vehicle dominance and provision of variable message HGV signing. In addition a new cycle link and footway improvements
- minor traffic management improvement works and pedestrian ferry link improvements in Torpoint
- pedestrian safety improvements in Looe

6.4 Monitoring and Targets

The Performance Indicators (PIs) and targets have been developed using the advice given in the Department of Transport guidance. A set of PIs and targets have been identified based on national and regional criteria, as well as identifying those needed at a local level to reflect progress for particular local circumstances. All of the targets reflect the wider vision and aims of the Transport Plan, which in turn are linked to wider local community objectives and priorities.

The targets related to the delivery of the strategies contained in the Annex to the Local Transport Plan can be found in Table F1 of Appendix F and are based on the current level of funding available.

7.0 Conclusions and recommendations

The nitrogen dioxide passive diffusion tube monitoring data for 2006, adjusted by the annual average UK bias adjustment factor of 0.98 and by the local bias adjustment factor of 1:00, indicates that the annual mean objective has been significantly exceeded at Tideford, and the concentrations at Gunnislake and Carkeel are approaching the objective.

It is therefore recommended that a Detailed Assessment is undertaken at Tideford, that further tubes are placed at all three sites and that the tube shelter currently located at Tideford is relocated to Gunnislake. It is also recommended that further attempts are made to find a suitable site for a continuous analyser at Gunnislake and at Carkeel.

In response to the conclusions of the CAQF diffusion tube survey in Liskeard, it is recommended that a number of diffusion tubes are located in relevant locations in Barn Street, Liskeard.

The results of the continuous monitoring indicate that all measured concentrations fall well below the AQS Objectives. It is therefore recommended that the continuous monitoring sites are reassessed with a view to removing or relocating the analyzers.

There was no new development during 2007 that will impact on air quality. The A38 Dobwalls bypass will significantly improve the air quality at Dobwalls, and improvements were already seen during 2007, likely to be due to new traffic management schemes during construction of the bypass.

All actions relevant to Caradon in the Cornwall Air Quality Strategy have either been implemented, cancelled in the light of new information or are in progress.

No planning applications were received in 2007 for developments for which an air quality assessment was provided, although four air quality assessments have been requested for proposed development in 2008..

The overall five year delivery programme of the Cornwall Transport Plan 2006 – 2011 includes the delivery of traffic management improvements in Liskeard, minor traffic management improvement works and pedestrian ferry link improvements in Torpoint and pedestrian safety improvements in Looe

Appendix A

Table A1: AQS Objectives for the protection of human health

Pollutant	**Objective**	**Measured as**	**To be achieved and maintained**
Benzene	16.25 µg.m^{-3}	Running annual mean	31/12/2003
	5 µg.m^{-3}	Annual mean	31/12/2010
1,3-Butadiene	2.25 µg.m^{-3}	Running annual mean	31/12/2003
Carbon monoxide	10.0 mg.m^{-3}	Maximum daily running 8-hour mean	31/12/2003
Lead	0.5 µg.m^{-3}	Annual mean	31/12/2004
	0.25 µg.m^{-3}	Annual mean	31/12/2008
Nitrogen dioxide	200 µg.m^{-3} Not to be exceeded more than 18 times per year	1-hour mean	31/12/2005
	40 µg.m^{-3}	Annual mean	31/12/2005
Particles (PM_{10})	50 µg.m^{-3} Not to be exceeded more than 35 times per year	24-hour mean	31/12/2004
	40 µg.m^{-3}	Annual mean	31/12/2004
Sulphur dioxide	266 µg.m^{-3} Not to be exceeded more than 35 times per year	15-minute mean	31/12/2005
	350 µg.m^{-3} Not to be exceeded more than 24 times per year	1-hour mean	31/12/2004
	125 µg.m^{-3} Not to be exceeded more than 3 times per year	24-hour mean	31/12/2004

Table A2: Examples of where the Objective should and should not apply		
Averaging period	Objective should apply at:	Objective should generally not apply at
Annual mean	All locations where members of the public might be regularly exposed, for example: Building facades of residential properties, schools, hospitals, libraries etc	Building facades of offices or other places of work where members of the public do not have regular access. Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other locations where public exposure is expected to be short-term
24-hour and 8-hour mean	All above locations at where the annual mean objective would apply. Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other locations where public exposure is expected to be short-term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply Kerbside sites (eg pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend 1-hour or more. Any outdoor locations to which the public might reasonably expected to spend 1-hour or longer.	Kerbside sites where the public would not be expected to have regular access
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer	

Table A3: Monitoring locations	
Site type	Description
Urban Centre	An urban location representative of typical population exposure in towns or city centres e.g. pedestrian precincts and shopping areas
Urban Background	An urban location distanced from sources and therefore broadly representative of city-wide background conditions e.g. urban residential areas.
Suburban	A location type situated in a residential area on the outskirts of a town or city
Roadside	A site sampling between 1m of the kerbside of a busy road and back of the pavement. Typically this will be within 5m of the road, but could be up to 15m.
Kerbside	A site sampling within 1m of the kerb of a busy road.
Industrial	An area where industrial sources make an important contribution to the total pollution.
Rural	An open countryside location, in an area of low population density distanced as far as possible from roads, populated and industrial areas.
Other	Any special source-oriented category covering monitoring undertaken in relation to specific emission sources such as power stations, car-parks, airports or tunnels.

Appendix B

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm $^{-3}$	Tube 2 µgm $^{-3}$	Tube 3 µgm $^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1			12.7	14.4	13.7	14	0.8	6	2.1
2			18.9	17.6	17.2	18	0.9	5	2.3
3			16.8	18.9	17.9	18	1.0	6	2.6
4			18.2	28.8	17.9	22	6.2	29	15.4
5			11.5	12.3	12.1	12	0.4	3	1.0
6			14.9	15.6	14.6	15	0.5	3	1.3
7			13.4	12.5	12.7	13	0.5	4	1.2
8			13.7	12.5	13.2	13	0.6	5	1.5
9			15.8	15.5	7.2	13	4.9	38	12.1
10			24.0	22.8	24.3	24	0.8	3	1.9
11			37.2	24.6	25.4	29	7.0	24	17.5
12			21.9	22.2	25.4	23	1.9	8	4.7
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method	
Period Mean	Data Capture (% DC)
14.3	97.5
20.4	97.8
17.9	97.5
24.3	96.0
13.7	97.2
13.3	97.9
10.7	97.9
11.0	92.6
15.0	97.2
24.6	97.3
26.3	97.9
22.0	97.8

Data Quality Check	
Tubes Precision Check	Automatic Monitor Data
Good	Good
Good	Good
Good	Good
Poor Precision	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Poor Precision	Good
Good	Good
Poor Precision	Good
Good	Good
Poor precision	Good Overall DC

Overall survey -->

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	New Road, Saltash

Precision: 9 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

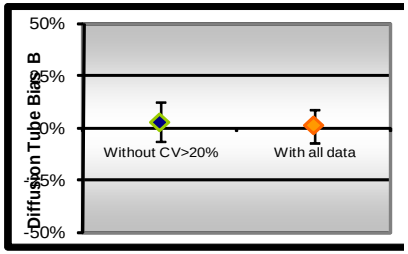
Bias calculated using 9 periods of data

Bias factor A	0.99 (0.91 - 1.09)
Bias B	1% (-9% - 10%)
Diffusion Tubes Mean:	17 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	16 µgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	16 (15 - 18) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 12 periods of data

Bias factor A	1 (0.93 - 1.1)
Bias B	0% (-9% - 8%)
Diffusion Tubes Mean:	18 µgm^{-3}
Mean CV (Precision):	11 caution
Automatic Mean:	18 µgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	18 (16 - 19) µgm^{-3}



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Version 03 - November 2006

Figure B1: Precision and accuracy of triplicate tubes

Appendix C

Table C1: Diffusion tube monitoring results 2007

2007 data Site name and description		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	Number months of data	Local bias factor	UK bias factor
		ug m^{-3}	ug m^{-3}	ug m^{-3}	ug m^{-3}	ug m^{-3}	ug m^{-3}	ug m^{-3}	ug m^{-3}	ug m^{-3}	ug m^{-3}	ug m^{-3}	ug m^{-3}				
	Bias Adjustment factor															**1.00**	**0.98**
R	Callington Launceston Rd	18.65	22.61	24.15	29.21	18.38	11.88							20.81	6	20.81	20.40
S	Callington St Therese Close	7.58	11.22		8.97	6.03	6.69	6.53	5.99	7.84	10.54	11.13	13.40	8.72	11	8.72	8.55
R	Carkeel A388	23.43	30.35	37.36	39.18		32.69	27.65	29.62	34.35	49.56	44.82	36.67	35.06	11	35.06	34.36
R	Doubleboise A38	17.52	22.42	22.77	26.95	20.76	26.49	20.48	21.36	24.34	31.08	29.41	21.98	23.80	12	23.80	23.32
R	East Taphouse A390	17.52	18.75	24.85	23.81	20.82	9.29							19.17	6	19.17	18.79
R	Gunnislake Fore Street	37.15	35.39	37.18	45.06	33.05	34.87	33.82	33.37	37.96		44.90	38.29	37.37	11	**37.37**	**36.62**
R	Gunnislake Swiss Cottage							36.22	33.92	32.99	41.21		44.25	37.72	5	**37.72**	**36.96**
R	Gunnislake Under Road 1								18.19			24.53	26.54	23.09	3	23.09	22.62
R	Gunnislake Under Road 2								25.04	12.40	17.14	19.79	19.83	18.84	5	18.84	18.46
R	Kelly Bray Launceston Rd	17.24	18.90	23.64	22.15	16.58	9.11							17.94	6	17.94	17.58
R	Liskeard Barrass Street		24.58	29.62	38.86	22.08	29.58	22.78	24.97	29.95	34.34	32.61	34.65	29.46	11	29.46	28.87
S	Liskeard Hanson Road	9.46	10.93	8.20	8.49	5.06	3.34							7.58	6	7.58	7.43
R	Liskeard Stanley Maggs	13.28	17.22	14.09	17.06	14.29	8.51							14.08	6	14.08	13.79
S	Looe Goonwartha Road	8.77	12.15		10.02	6.82	3.86							8.32	5	8.32	8.16
R	Millbrook West Street	25.41	27.43	27.15	26.21	25.55	29.81	29.76	29.08	26.67		33.68	28.09	28.08	11	28.08	27.51
S	Saltash Edwards Crescent	9.58	12.10	9.94	11.17	4.89		4.59	5.39	7.29	12.20	13.69	15.21	9.64	11	9.64	9.45
R	Saltash Fore Street	23.87	25.18	30.57	34.37		26.58	26.06	26.97	31.94	36.75	24.36	31.55	28.93	11	28.93	28.35
R	St Anns Chapel A390	9.63	13.72	14.41	13.43	10.38	6.43							11.33	6	11.33	11.11
R	St Mellion A388	25.29	20.82	27.03	25.53	26.92	12.64							23.04	6	23.04	22.58
R	Tideford A38 (Mill Road)	54.09	58.83	56.47	66.21		66.47	57.48	56.44	56.53	72.99	64.21	53.03	60.25	11	**60.25**	**59.05**
R	Tideford A38 (Mill Rd)(box)								53.48	52.55	64.81	56.63	44.66	54.43	5	**54.43**	**53.34**
R	Tideford A38 (Quay Road)							57.98	45.45	51.83	62.30	59.19	51.37	54.69	6	**54.69**	**53.59**
R	Tideford Bridge Road							26.43	27.61	27.78	30.45	36.15	35.22	30.61	6	30.61	29.99
R	Tideford Corner House							20.13	22.51	22.11	23.86	29.09	25.78	23.91	6	23.91	23.44
R	Torpoint Harvey Street	25.19	28.29	27.35	28.42	24.13	29.37	25.44	22.21	23.51	30.23	31.75	33.12	27.42	12	27.42	26.87

Pink highlight indicates sites that are approaching the annual object

Red highlight indicates sites that have exceeded the annual objective

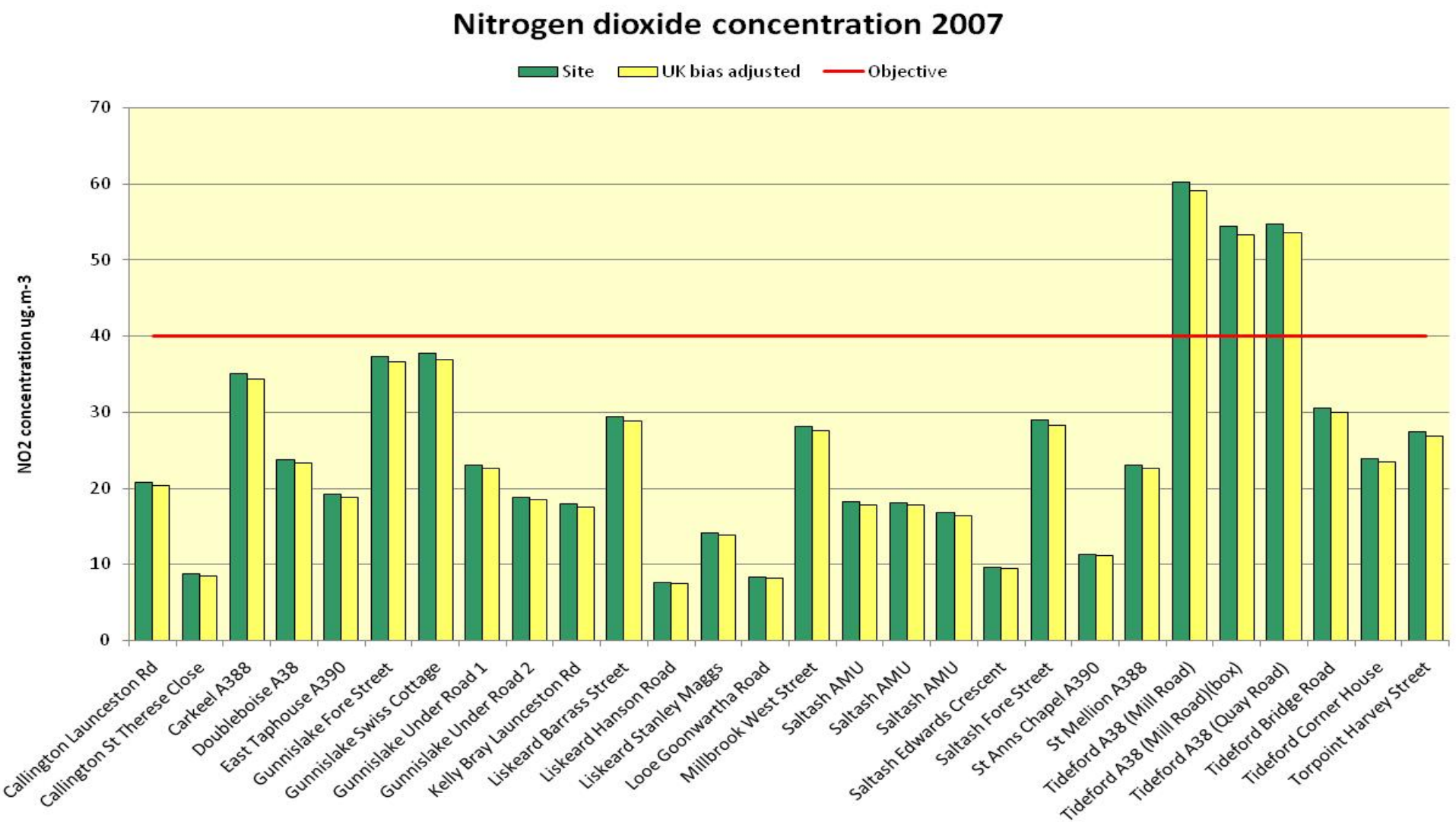
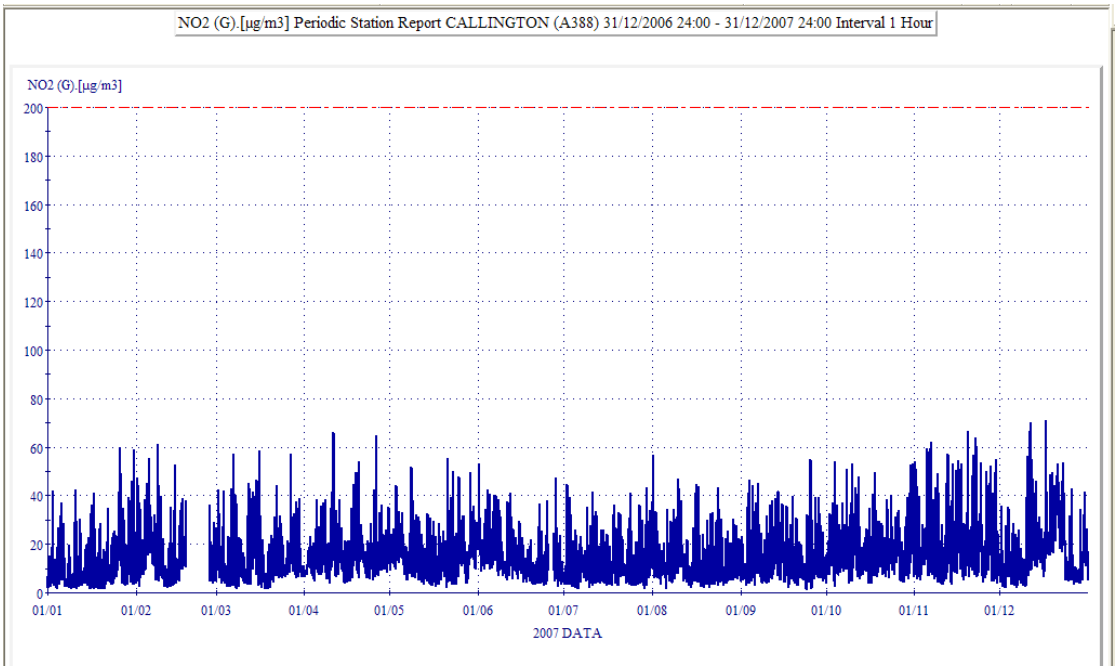


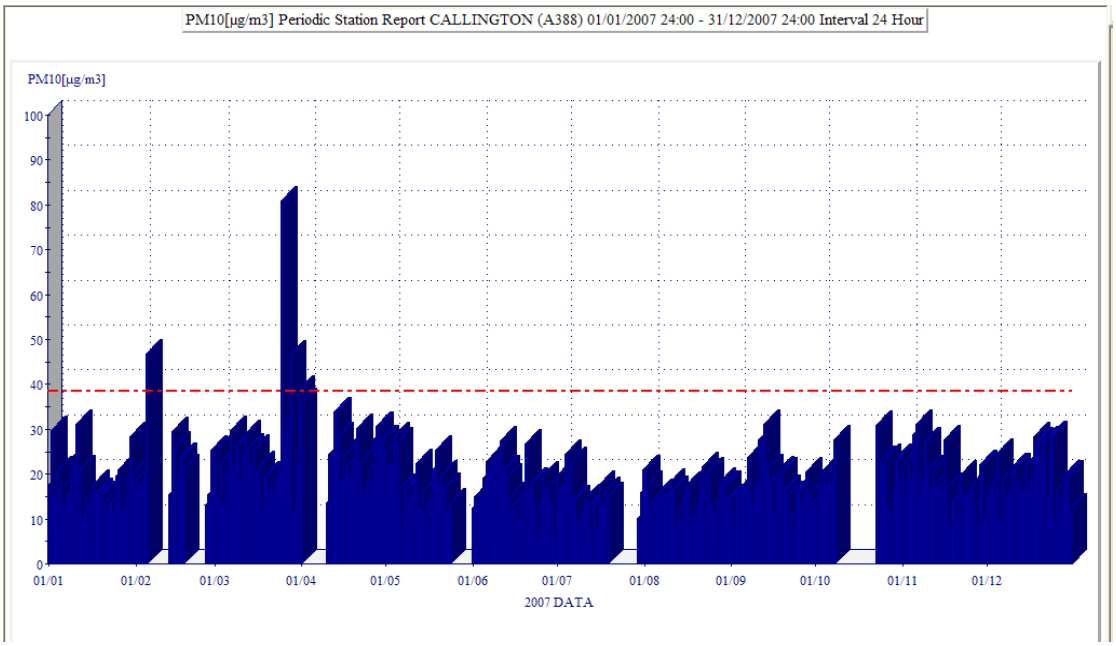
Figure C1: graph of Caradon diffusion tube data 2007

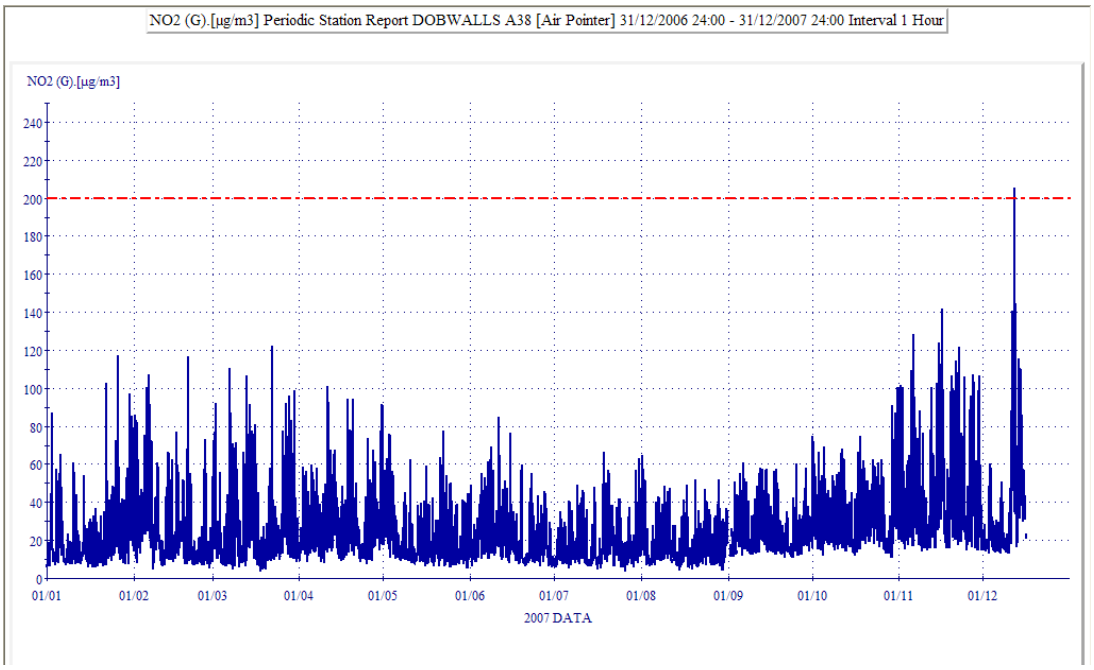
Table C2: predicted nitrogen dioxide concentrations μg.m-3						
2007 data Site name and description		Local bias factor	UK bias factor	Predicted values based on 2007 local bias adjusted data		
		2007	2007	2008	2009	2010
	Bias Adjustment factor	**1.00**	**0.98**			
R	Callington Launceston Rd	20.81	20.40	19.88	18.94	18.08
S	Callington St Therese Close	8.72	8.55	8.33	7.94	7.58
R	Carkeel A388	35.06	34.36	33.48	31.91	30.46
R	Doubleboise A38	23.80	23.32	22.73	21.65	20.67
R	East Taphouse A390	19.17	18.79	18.31	17.45	16.66
R	Gunnislake Fore Street	37.37	36.62	35.69	34.00	32.46
R	Gunnislake Swiss Cottage	37.72	36.96	36.02	34.32	32.77
R	Gunnislake Under Road 1	23.09	22.62	22.05	21.01	20.06
R	Gunnislake Under Road 2	18.84	18.46	17.99	17.14	16.37
R	Kelly Bray Launceston Rd	17.94	17.58	17.13	16.32	15.58
R	Liskeard Barrass Street	29.46	28.87	28.13	26.81	25.59
S	Liskeard Hanson Road	7.58	7.43	7.24	6.90	6.59
R	Liskeard Stanley Maggs	14.08	13.79	13.44	12.81	12.23
S	Looe Goonwartha Road	8.32	8.16	7.95	7.57	7.23
R	Millbrook West Street	28.08	27.51	26.81	25.55	24.39
R	Saltash AMU	18.25	17.88	17.43	16.61	15.85
R	Saltash AMU	18.14	17.78	17.33	16.51	15.76
R	Saltash AMU	16.78	16.45	16.03	15.27	14.58
S	Saltash Edwards Crescent	9.64	9.45	9.21	8.77	8.38
R	Saltash Fore Street	28.93	28.35	27.63	26.32	25.13
R	St Anns Chapel A390	11.33	11.11	10.82	10.31	9.85
R	St Mellion A388	23.04	22.58	22.00	20.96	20.01
R	Tideford A38 (Mill Road)	60.25	59.05	57.54	54.83	52.34
R	Tideford A38 (Mill Road)(box)	54.43	53.34	51.98	49.53	47.28
R	Tideford A38 (Quay Road)	54.69	53.59	52.23	49.76	47.51
R	Tideford Bridge Road	30.61	29.99	29.23	27.85	26.59
R	Tideford Corner House	23.91	23.44	22.84	21.76	20.77
R	Torpoint Harvey Street	27.42	26.87	26.18	24.95	23.82

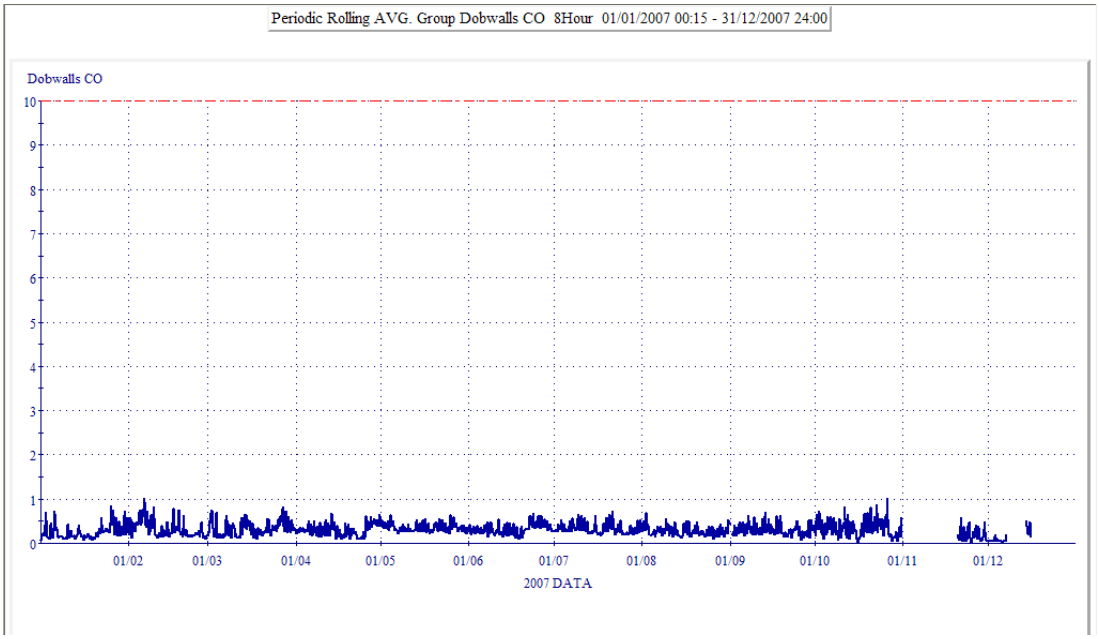
Predicted values have been calculated using the methodology in box 6.6 of Technical Guidance LAQM TG(03) [DEFRA 2003]

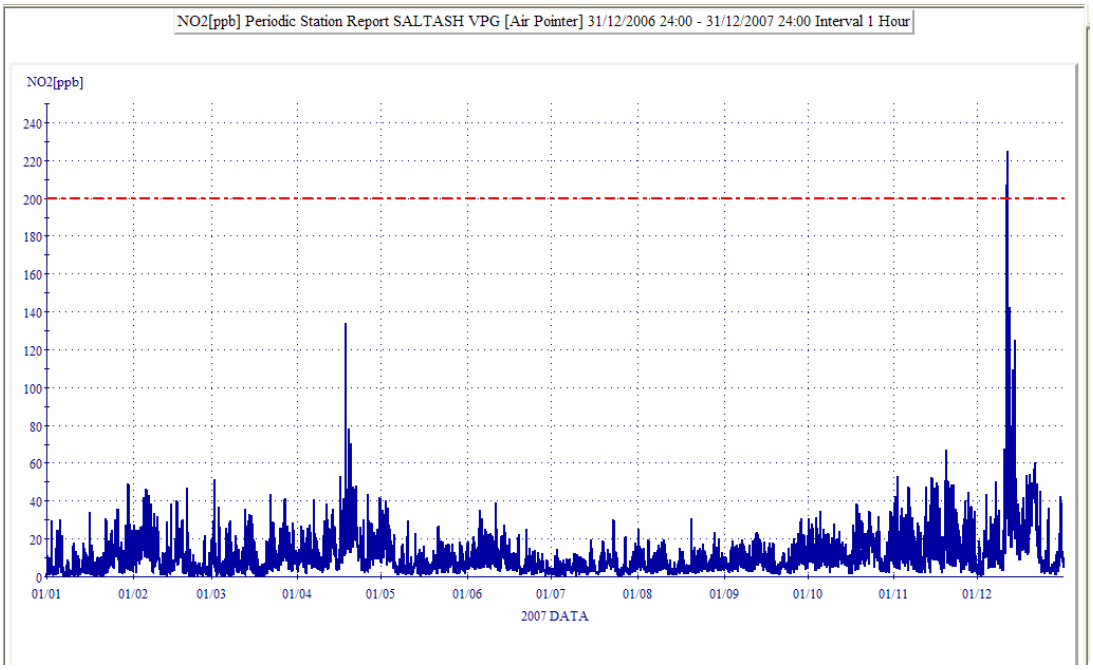
Appendix D

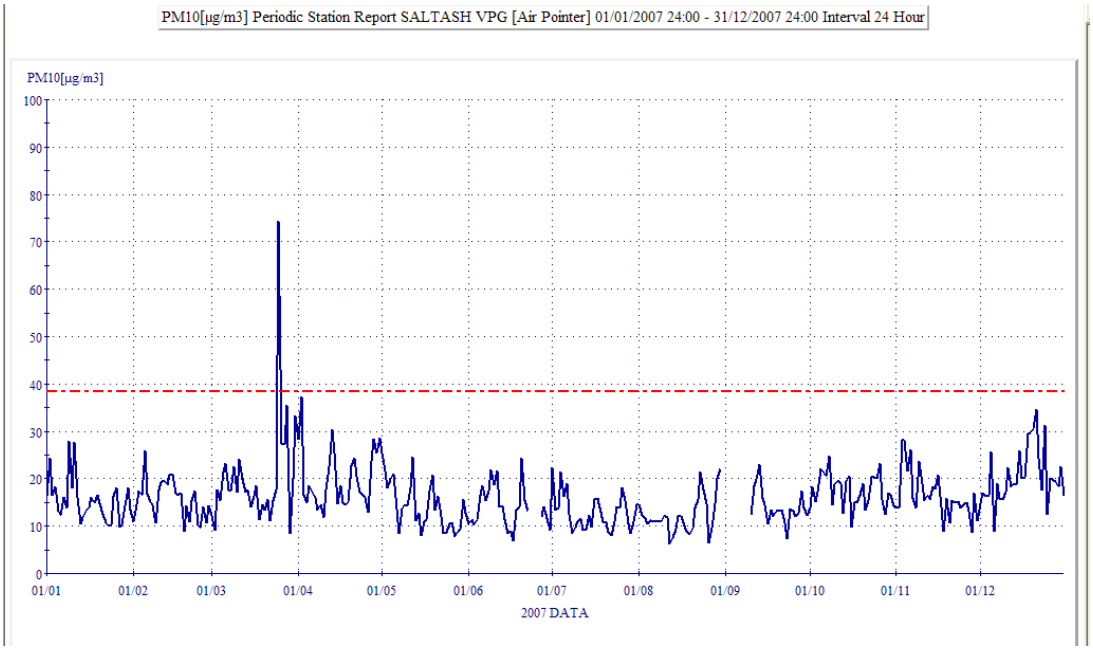

NO2 (G).[µg/m3] Periodic Station Report CALLINGTON (A388) 31/12/2006 24:00 - 31/12/2007 24:00 Interval 1 Hour
NO2 (G).[µg/m3]
200
180
160
140
120
100
80
60
40
20
0
01/01
01/02
01/03
01/04
01/05
01/06
01/07
01/08
01/09
01/10
01/11
01/12
2007 DATA

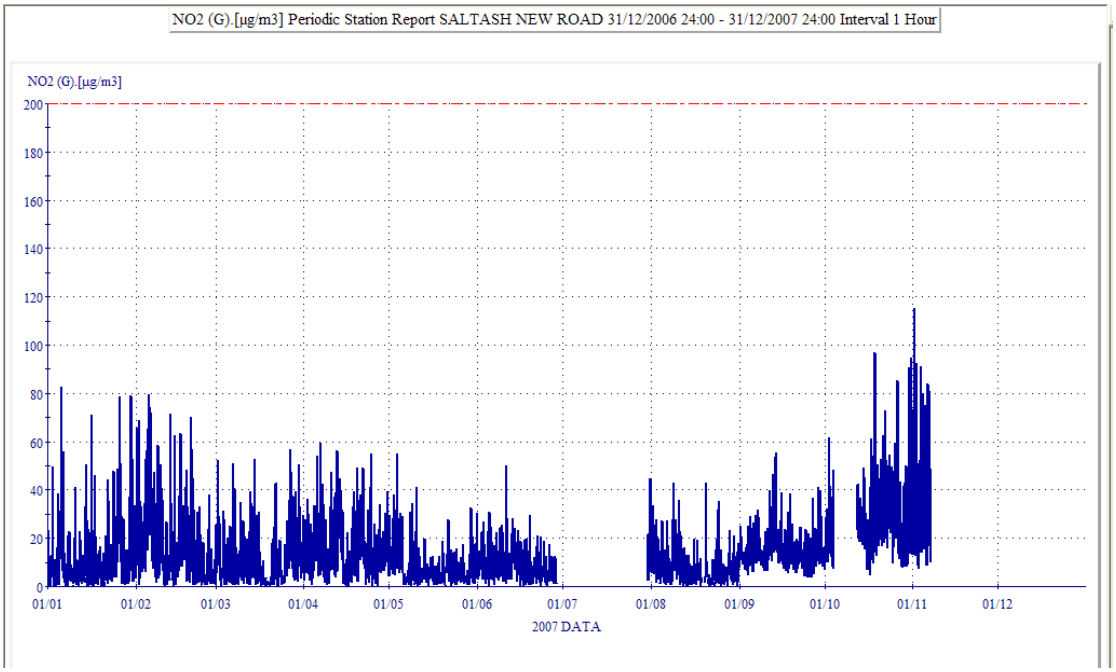

PM10[µg/m3] Periodic Station Report CALLINGTON (A388) 01/01/2007 24:00 - 31/12/2007 24:00 Interval 24 Hour
PM10[µg/m3]
100
90
80
70
60
50
40
30
20
10
0
01/01
01/02
01/03
01/04
01/05
01/06
01/07
01/08
01/09
01/10
01/11
01/12
2007 DATA

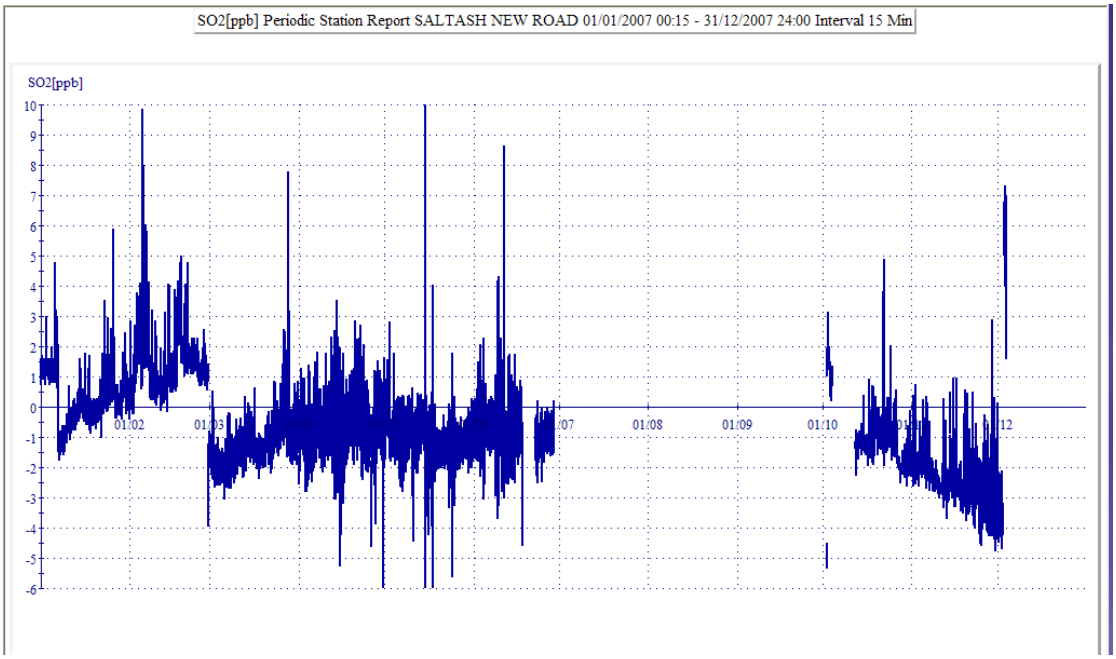

NO2 (G).[µg/m3] Periodic Station Report DOBWALLS A38 [Air Pointer] 31/12/2006 24:00 - 31/12/2007 24:00 Interval 1 Hour
NO2 (G).[µg/m3]
240
220
200
180
160
140
120
100
80
60
40
20
0
01/01
01/02
01/03
01/04
01/05
01/06
01/07
01/08
01/09
01/10
01/11
01/12
2007 DATA

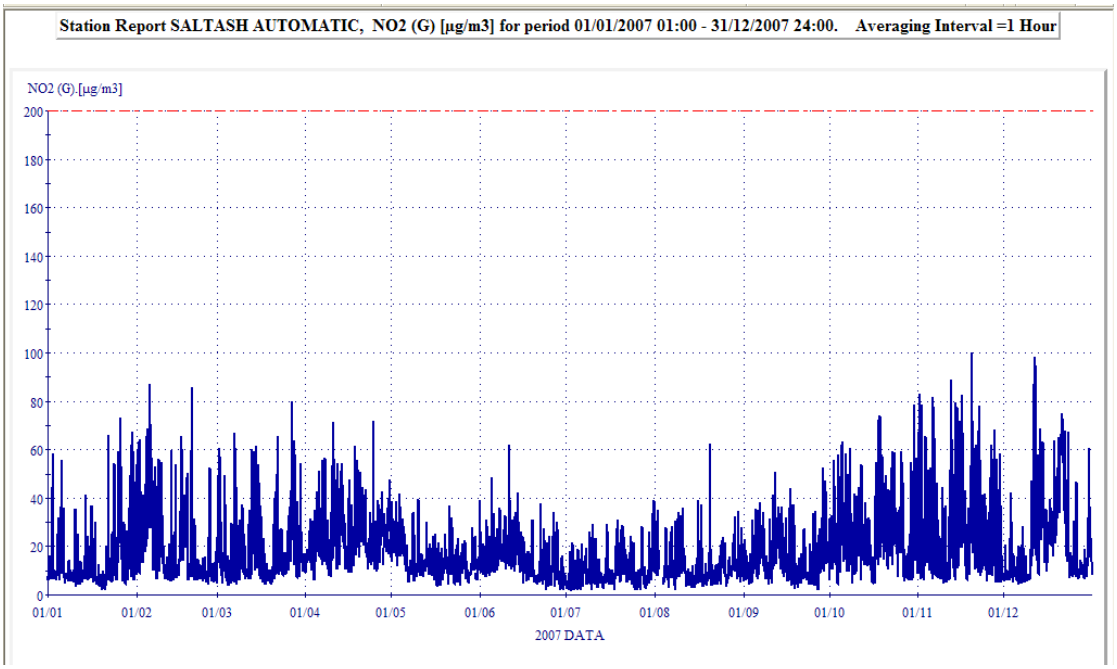

Periodic Rolling AVG. Group Dobwalls CO 8Hour 01/01/2007 00:15 - 31/12/2007 24:00
Dobwalls CO
10
9
8
7
6
5
4
3
2
1
0
01/02
01/03
01/04
01/05
01/06
01/07
01/08
01/09
01/10
01/11
01/12
2007 DATA

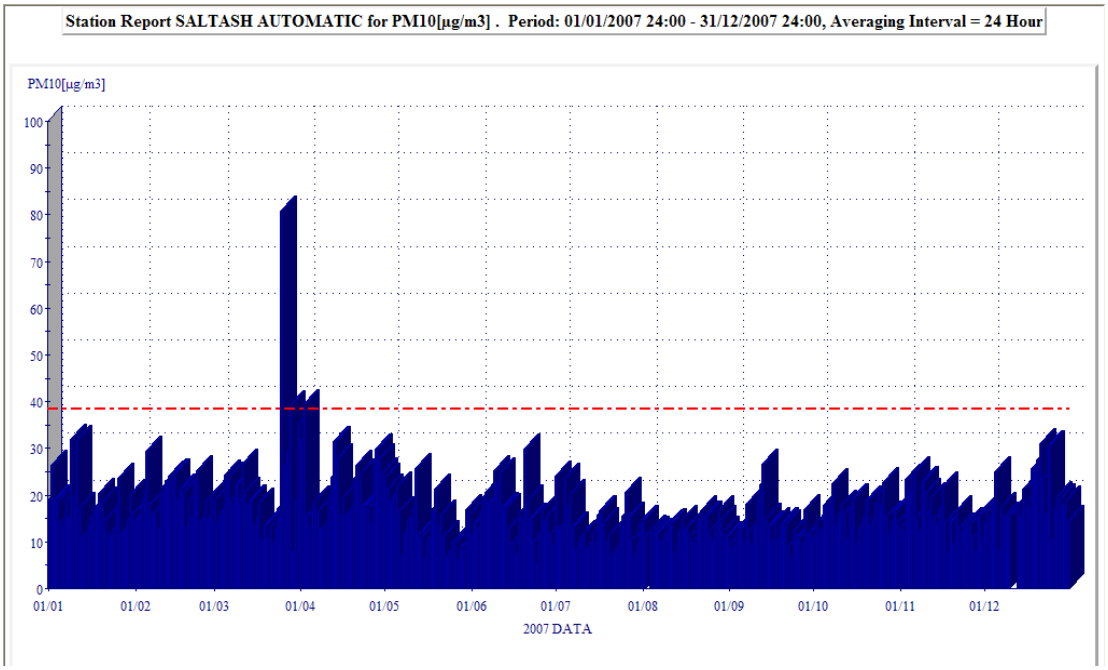

NO2[ppb] Periodic Station Report SALTASH VPG [Air Pointer] 31/12/2006 24:00 - 31/12/2007 24:00 Interval 1 Hour
NO2[ppb]
240
220
200
180
160
140
120
100
80
60
40
20
0
01/01
01/02
01/03
01/04
01/05
01/06
01/07
01/08
01/09
01/10
01/11
01/12
2007 DATA


PM10[µg/m3] Periodic Station Report SALTASH VPG [Air Pointer] 01/01/2007 24:00 - 31/12/2007 24:00 Interval 24 Hour
PM10[µg/m3]
100
90
80
70
60
50
40
30
20
10
0
01/01
01/02
01/03
01/04
01/05
01/06
01/07
01/08
01/09
01/10
01/11
01/12
2007 DATA


NO2 (G).[µg/m3] Periodic Station Report SALTASH NEW ROAD 31/12/2006 24:00 - 31/12/2007 24:00 Interval 1 Hour
NO2 (G).[µg/m3]
200
180
160
140
120
100
80
60
40
20
0
01/01
01/02
01/03
01/04
01/05
01/06
01/07
01/08
01/09
01/10
01/11
01/12
2007 DATA


SO2[ppb] Periodic Station Report SALTASH NEW ROAD 01/01/2007 00:15 - 31/12/2007 24:00 Interval 15 Min
SO2[ppb]
10
9
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
01/02
01/08
01/09
01/10


Station Report SALTASH AUTOMATIC, NO2 (G) [µg/m3] for period 01/01/2007 01:00 - 31/12/2007 24:00. Averaging Interval =1 Hour
NO2 (G) [µg/m3]
200
180
160
140
120
100
80
60
40
20
0
01/01
01/02
01/03
01/04
01/05
01/06
01/07
01/08
01/09
01/10
01/11
01/12
2007 DATA


Station Report SALTASH AUTOMATIC for PM10[µg/m3] . Period: 01/01/2007 24:00 - 31/12/2007 24:00, Averaging Interval = 24 Hour
PM10[µg/m3]
100
90
80
70
60
50
40
30
20
10
0
01/01
01/02
01/03
01/04
01/05
01/06
01/07
01/08
01/09
01/10
01/11
01/12
2007 DATA

Appendix E

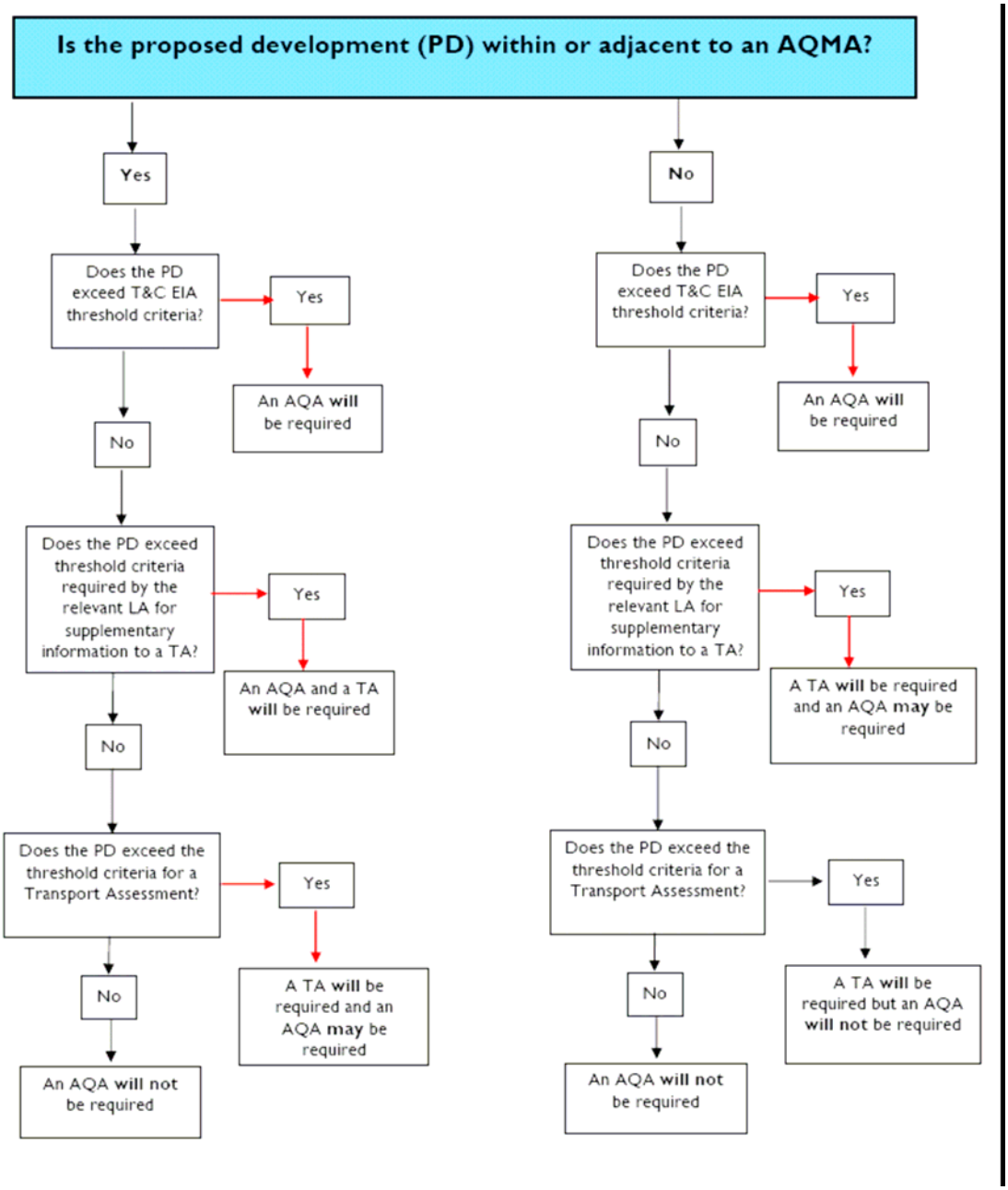


Figure E1: flowchart to determine whether or not an air quality assessment is required [CAQF 2007]

Appendix F

Table F1: Local Transport Plan Targets to improve air quality

Indicator	Indicator Description	Baseline	Target
BV 102	Bus passenger journeys	2003/04	4% increase by 2010/11
BV 103	Satisfaction with public transport information	2003/04	46% in 2009/10
BV 104	Satisfaction with bus services	2003/04	46% in 2009/10
LTP 2	Change in area wide road traffic mileage	2004	Limited to a 11% increase by 2010
LTP 3	Cycling trips	2003/04	12% increase by 2010/11
LTP 4a	Mode share of journeys to school (50 principal schools)	2004/05	5% reduction in car journeys by 2010/11
LTP 4b	Mode share of journeys to school (all schools)	2006/07	No increase in car journeys by 2010/11
LTP 5	Bus punctuality (intermediate timing points)	2005/06	86% by 2010/11
REG 1	Southwest TRIP - data completeness to timing point level	2005/06	100% by 2010/11
REG 2	Southwest TRIP - data completeness to all stop level	2005/06	99% by 2010/11
REG 3	Southwest TRIP - verified Traveline data	2005/06	90% by 2010/11
CCC 1	Changes in peak period traffic flows in urban centres	2005/06	No increase by 2010/11
CCC 2	Rail passenger journeys	2004/05	16.5% increase by 2010/11
CCC 3	Car parking pricing differential	2005/06	No reduction by 2010/11
CCC 4	Walking journeys	2005/06	5% increase by 2010/11
CCC 5	Single occupancy car trips for identified employment sites	2006/07	5% decrease by 2010/11
CCC 6	Summer peak public transport trips	2005/06	5% increase by 2010/11
CCC 7	EU Objective One related transport schemes that will contribute towards the broader EU Objective One outcomes for Cornwall	Based on individual scheme outcomes	

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UWE 2008[2]: University of the West of England, Air Quality Management website, *co-location data* webpage. Available at: www.uwe.ac.uk/aqm/review/diffusiontube300908.xls